United States Department of Agriculture

Food Safety And Inspection Service

Serotypes Profile of *Salmonella* Isolates from Meat and Poultry Products January 1998 through December 2013

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*Note: *Salmonella* Bareilly was ranked as number 10 in the Center of Disease Control and Prevention's list of the most frequently reported serotypes in the US in 2012. There has been no *Salmonella* Bareilly isolates detected in the PR/HACCP program in the 16 years of testing and they are therefore not included in this report.

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Serotypes Profile of *Salmonella* Isolates from Meat and Poultry Products January 1998 through December 2013

The Food Safety and Inspection Service (FSIS) conducts *Salmonella* serotype testing on sample isolates collected from raw meat and poultry products at all slaughter facilities under the Pathogen Reduction Hazard Analysis and Critical Control Point (PR/HACCP) program (1). The serotype results are presented here and provide an estimate of relative serotype distributions in raw products for each product class during the 16-year period following implementation of the PR/HACCP program (1998-2013). The information in this report supports food safety national strategic goals to better understand *Salmonella* as a foodborne pathogen.

Background

In the early- to mid-1990s, FSIS conducted nationwide microbiological baseline studies that estimated the prevalence and levels of bacteria of public health concern in specific food commodities (10). FSIS used this information to develop performance standards for carcasses of cow/bulls, steers/heifers, market hogs (2), broilers, ground beef, ground chicken, and ground turkey (5,10). In July 1996, FSIS published the (PR/HACCP) Systems, Final Rule, which established *Salmonella* performance standards for establishments that slaughter or produce selected classes of food animals or raw ground products (4). The *Salmonella* performance standards provide a measurable standard by which industry can calibrate their HACCP systems and FSIS inspection personnel can monitor the effectiveness of an establishment's HACCP controls. The performance standards include a description of the maximum number of positive samples allowed in a sample set. The number of samples and allowable positives in a sample set vary by product class and pathogen. In June 2006, FSIS implemented *Salmonell*a performance standards for turkey carcasses (10). In 2011, FSIS implemented more stringent standards for *Salmonella* and *Campylobacter* in poultry carcasses (chicken/turkey) (8).

Prior to 2006, there were two phases of the PR/HACCP for *Salmonella* in raw products: non-targeted and targeted testing. FSIS collected non-targeted or "A" set samples at establishments randomly selected from the population of eligible establishments with a goal of scheduling every eligible establishment at least once a year. Other codes (such as "B", "C", and "D") represented sample sets collected from establishments targeted for follow-up testing following a failed set.

In June 2006, FSIS began to schedule establishments based on new criteria that are risk-based, rather than random (6,7). The new scheduling criteria focused FSIS resources on establishments with the most *Salmonella*-positive samples, including serotypes most frequently associated with human salmonellosis (3). As a result of this change in sampling, results from establishments prior to June 2006 cannot be compared to those reported following the new schedule. For such comparisons, nationwide baseline study results provide valid estimates of the prevalence of certain pathogens of public health concern and allow for valid statistical comparison over time (10).

[1] Egg products under jurisdiction of USDA/FSIS are not currently under HACCP regulations.
[2] FSIS suspended scheduling cows/bulls from sampling in 2011 and market hogs and steer/heifers in 2012 because of the low number of positive samples.

Highlights, 2013

In 2013, FSIS identified and serotyped 878 *Salmonella*-positive meat or poultry samples. The "top ten" most common serotypes identified include:

1. Kentucky 28% (248/878)
2. Montevideo 10% (89/878)
3. Enteritidis 9.4% (83/878)
4. Typhimurium 8.7% (77/878)
5. Infantis 4.8% (43/878)
6. Heidelberg 4.1% (36/878)
7. I 4,[5],12:i:- 3.6% (32/878)
8. Schwarzengrund 2.6% (23/878)
9. Muenchen 2.5% (22/878)
10. Dublin 2.1% (19/878) and Newport 2.1% (19/878)

FSIS compares the CDC data on serotypes isolated from human salmonellosis cases to *Salmonella* serotype data isolated from meat and poultry products (1,2,3). In 2012, the CDC identified Enteritidis, Typhimurium (including Typhimurium var. 5-), Newport, Javiana, I 4,[5],12:i:-, Montevideo, Infantis, Muenchen, Heidelberg, and Bareilly as the ten most commonly identified serotypes causing human salmonellosis in the United States (3).

The top 10 serotypes found in meat and poultry products in 2013 that were among CDC's top 10 list for 2012 were Enteritidis, Typhimurium, Newport, Heidelberg, Infantis, I 4,[5],12:i:-, Montevideo, and Muenchen (3). Because human salmonellosis cases are attributable to non-FSIS regulated foods and non-food sources, FSIS works closely with its public health partners to identify the proportion of human salmonellosis attributable to FSIS regulated products.

Summary of PR/HACCP Data (1998-2013)

Since 1998, *Salmonella* Kentucky has ranked as the most common serotype identified among young chicken (broilers) samples during the last 16 years. Prior to 2005, *Salmonella* Heidelberg has ranked as the second most common serotype in broilers. Since then *Salmonella* Enteriditis has ranked in the second position among broilers.

For ground chicken samples, *Salmonella* Enteritidis and *Salmonella* Kentucky alternate between the first and second most common serotypes. For ground turkey samples, Salmonella Heidelberg ranked as the most common serotype identified followed by *Salmonella* Hadar. For young turkey (turkey carcasses) sample sets, that began in 2006, *Salmonella* Hadar has ranked as the most common serotype identified followed by *Salmonella* Heidelberg.

Because of the low number of positive samples recovered from the cow/bull and steer/heifer product classes, sample set scheduling was suspended for cow/bulls in 2011 and steer/heifers in 2012.

From 1998-2010, *Salmonella* Derby was ranked as the most common serotype in market hogs. In 2011, *Salmonella* Adelaide ranked as the most common serotype and *S.* Derby moved to the number three position. In 2012, *Salmonella* St. Paul was the only identified serotype in market hogs. Market hog sampling was suspended in 2012 due to the low number of positive samples.

Tables and Figures

Each table presented in this report identifies the ten most common *Salmonella* serotypes isolated annually per specific product class (1998-2013). When more than one serotype ranks in tenth place, each serotype in tenth place is listed (Table 1-8). The 10 most common serotypes isolated from a specified product class during a given year are identified by name while less commonly identified serotypes are included in the "other serotypes" category. When FSIS could not identify a specific serotype or identified a sample as monophasic[3] or nonmotile[4], the sample was entered as "Unidentified" in the tables. Samples that FSIS was unable to serotype are listed in the tables as "Not typed." Each table includes the number of isolates of each serotype and category, the percent of total serotyped isolates, and the percent of total samples collected.

Figure 1 displays, by year, the three most common serotypes isolated from ground beef, young chicken, ground chicken and young, turkey from 1998-2013. Five serotypes are listed in the number one position for ground turkey.

Figure 2 identifies the proportion of CDC's top 20 serotypes that cause human salmonellosis in the United States out of the total *Salmonellae* isolated through PR/HACCP testing of meat and poultry products. The more commonly isolated serotypes in human salmonellosis cases vary from year-to-year both within and between product classes.

Conclusion

Recurring critical review and analysis of *Salmonella* serotype data support both Healthy People 2020 goals and FSIS' strategic goals to reduce salmonellosis illnesses attributable to FSIS regulated products. The serotype data along with other sampling data collected through the PR/HACCP program is used to inform FSIS regulatory decisions and Agency policy development, inform in-plant best practices and outbreak investigations, and advance our understanding of *Salmonella* as a foodborne pathogen.

To more closely estimate the prevalence of *Salmonella* in FSIS products and monitor trends, FSIS is changing its current sampling scheme from a set-based model to a continuous sampling model using moving windows to assess process control (9). The moving window approach provides FSIS with more flexibility for scheduling sample collection at different establishments.

[3] Monophasic means that the *Salmonella* will produce only one kind of flagellin based on its genetic make-up.
[4] Non-motile means that there is no genetic code in the *Salmonella* for the development of a functional flagellin.

References

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[6]Federal Register. 2006. *Salmonella* Verification Sample Results Reporting: Agency Policy and Use in Public Health Protection http://www.fsis.usda.gov/wps/wcm/connect/fea66683-f22a-43d2-a97e-e6c850fd67bc/04-026N.pdf?MOD=AJPERES

[7]Federal Register. 2008. Salmonella Verification Sampling Program: Response to Comments and New Agency Policies.

[8]FSIS. 2011. New Performance Standards for *Salmonella* and *Campylobacter* in Chilled Carcasses at Young Chicken and Turkey Slaughter Establishments. http://www.fsis.usda.gov/wps/wcm/connect/49d574f1-b0cc-4777-ab08-98f1c50455f2/2009-0034.pdf?MOD=AJPERES

[9]FSIS, 2015. The FSIS *Salmonella* Action Plan: A Year One Update. http://www.fsis.usda.gov/wps/portal/fsis/topics/food-safety-education/get-answers/food-safety-fact-sheets/foodborne-illness-and-disease/salmonella/sap-one-year

[10]FSIS, 2015. Baseline data. http://www.fsis.usda.gov/wps/portal/fsis/topics/data-collection-and-reports/microbiology/baseline/baseline

Table 1
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Chicken (Broilers)
(1998–2005 'A" Set Samples; 2006–2013 All Samples)

Serotypes 1998	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	139	26.68	2.46
Heidelberg	92	17.66	1.63
Typhimurium var. Copenhagen	41	7.87	0.72
Typhimurium	40	7.68	0.71
Hadar	33	6.33	0.58
Schwarzengrund	21	4.03	0.37
Montevideo	16	3.07	0.28
Enteritidis	14	2.69	0.25
Thompson	14	2.69	0.25
Infantis	7	1.34	0.12
Istanbul	7	1.34	0.12
[a]Other serotypes	58	11.13	1.02
[u]nidentified isolates	39	7.49	0.69
Total serotyped isolates	521		9.21
Not typed	92		1.63
Total positive	613		10.83
Total number of analyzed samples	5,659		

Table 1—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Chicken (Broilers)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 1999	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	188	25.72	2.78
Heidelberg	138	18.88	2.04
Hadar	83	11.35	1.23
Typhimurium var. Copenhagen	52	7.11	0.77
Typhimurium	41	5.61	0.61
Thompson	30	4.10	0.44
Litchfield	16	2.19	0.24
Infantis	15	2.05	0.22
Schwarzengrund	12	1.64	0.18
Istanbul	11	1.50	0.16
[a]Other serotypes	102	13.95	1.51
[b]Unidentified isolates	43	5.88	0.64
Total serotyped isolates	731		10.80
Not typed	41		0.61
*Total positive	772		11.41
Total number of analyzed samples	6,768		

Table 1—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Chicken (Broilers)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2000	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	219	25.49	2.18
Heidelberg	198	23.05	1.97
Typhimurium var. Copenhagen	57	6.64	0.57
Typhimurium	55	6.40	0.55
Hadar	42	4.89	0.42
Montevideo	37	4.31	0.37
Thompson	27	3.14	0.27
Schwarzengrund	25	2.91	0.25
Enteritidis	23	2.68	0.23
Berta	18	2.10	0.18
[a]Other serotypes	112	13.04	1.11
[b]Unidentified isolates	46	5.36	0.46
Total serotyped isolates	859		8.54
Not typed	55		0.55
Total positive	914		9.09
Total number of analyzed samples	10,057		

Table 1—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Chicken (Broilers)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2001	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	352	33.59	3.93
Heidelberg	260	24.81	2.90
Typhimurium	67	6.39	0.75
Typhimurium var. Copenhagen	35	3.34	0.39
Montevideo	32	3.05	0.36
Schwarzengrund	32	3.05	0.36
Hadar	31	2.96	0.35
Thompson	26	2.48	0.29
Enteritidis	17	1.62	0.19
Berta	13	1.24	0.15
[a]Other serotypes	121	11.55	1.35
[b]Unidentified isolates	62	5.92	0.69
Total serotyped isolates	1048		11.70
Not typed	17		0.19
*Total positive	1065		11.89
Total number of analyzed samples	8,955		

Table 1—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Chicken (Broilers)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2002	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	382	36.28	4.16
Heidelberg	262	24.88	2.85
Typhimurium var. Copenhagen	67	6.36	0.73
Hadar	46	4.37	0.50
Typhimurium	46	4.37	0.50
Enteritidis	33	3.13	0.36
Thompson	23	2.18	0.25
Montevideo	20	1.90	0.22
Schwarzengrund	18	1.71	0.20
Infantis	14	1.33	0.15
Mbandaka	14	1.33	0.15
[a]Other serotypes	70	6.65	0.76
[b]Unidentified isolates	58	5.51	0.63
Total serotyped isolates	1053		11.47
Not typed	6		0.07
*Total positive	1059		11.53
Total number of analyzed samples	9,183		

Table 1—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Chicken (Broilers)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2003	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	297	35.96	4.59
Heidelberg	164	19.85	2.54
Typhimurium var. Copenhagen	79	9.56	1.22
Typhimurium	50	6.05	0.77
Enteritidis	29	3.51	0.45
Infantis	20	2.42	0.31
Thompson	17	2.06	0.26
Montevideo	17	2.06	0.26
Hadar	15	1.82	0.23
Mbandaka	15	1.82	0.23
[a]Other serotypes	79	9.56	1.22
[b]Unidentified isolates	44	5.33	0.68
Total serotyped isolates	826		12.77
Not typed	2		0.03
*Total positive	828		12.80
Total number of analyzed samples	6,468		

Table 1—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Chicken (Broilers)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2004	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	409	42.74	5.78
Heidelberg	145	15.15	2.05
Typhimurium var. Copenhagen	84	8.78	1.19
Enteritidis	58	6.06	0.82
Typhimurium	50	5.22	0.71
[c]I 4,[5],12:i:-	29	3.03	0.41
Schwarzengrund	27	2.82	0.38
Montevideo	20	2.09	0.28
Mbandaka	15	1.57	0.21
Infantis	12	1.25	0.17
[a]Other serotypes	105	10.97	1.48
[b]Unidentified isolates	3	0.31	0.04
Total serotyped isolates	957		13.53
Not typed	0		
*Total positive	957		13.53
Total number of analyzed samples	7,072		

Table 1—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Chicken (Broilers)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2005	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	703	45.18	7.33
Heidelberg	226	14.52	2.36
Typhimurium	147	9.45	1.53
Enteritidis	120	7.71	1.25
[c]I 4,[5],12:i:-	87	5.58	0.90
Montevideo	54	3.47	0.56
Schwarzengrund	44	2.83	0.46
Thompson	18	1.16	0.19
Hadar	16	1.03	0.17
Mbandaka	16	1.03	0.17
[a]Other serotypes	121	7.78	1.26
[b]Unidentified isolates	4	0.26	0.04
Total serotyped isolates	1556		16.22
Not typed	3		0.03
Total positive	1559		16.25
Total number of analyzed samples	9,592		

Table 1 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Chicken (Broilers)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2006	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	570	48.97	5.58
Enteritidis	159	13.66	1.56
Heidelberg	132	11.34	1.29
Typhimurium	94	8.08	0.92
[c]I 4,[5]12:i:-	70	6.01	0.68
Montevideo	19	1.63	0.19
Schwarzengrund	15	1.29	0.15
Infantis	12	1.03	0.12
Mbandaka	12	1.03	0.12
[a]Other serotypes	75	6.44	0.73
[b]Unidentified	6	0.52	0.06
Total serotyped isolates	1164		11.41
Not typed	0		
Total positive	1164		11.41
Total number of analyzed samples	10,206		

Table 1 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Chicken (Broilers)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2007	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	379	47.14	4.03
Heidelberg	108	13.43	1.15
Enteritidis	87	10.82	0.92
Typhimurium	72	8.96	0.77
[c]I 4,[5],12:i:-	37	4.6	0.39
Montevideo	18	2.24	0.19
Berta	12	1.49	0.13
Infantis	12	1.49	0.13
Mbandaka	9	1.12	0.10
[a]Other serotypes	67	8.33	0.71
[b]Unidentified	3	0.37	0.03
Total serotyped isolates	804		8.55
Not typed	0		
Total positive	804		8.55
Total number of analyzed samples	9,408		

Table 1 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Chicken (Broilers)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2008	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	179	36.83	2.72
Enteritidis	89	18.31	1.35
Heidelberg	63	12.96	0.96
Typhimurium	56	11.52	0.85
[c]I 4,[5],12:i:-	16	3.29	0.24
Infantis	10	2.06	0.15
Montevideo	10	2.06	0.15
Schwarzengrund	7	1.44	0.11
Senftenberg	5	1.03	0.08
Thompson	5	1.03	0.08
[a]Other serotypes	41	8.44	0.62
[b]Unidentified	5	1.03	0.08
Total serotyped isolates	486		7.39
Not typed	0		
Total positive	486	100	7.39
Total number of analyzed samples	6,574		

Table 1 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Chicken (Broilers)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2009	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	183	39.61	2.84
Enteritidis	96	20.78	1.49
Heidelberg	65	14.07	1.01
Typhimurium	30	6.49	0.47
[c]8,20:-:z6	11	2.38	0.17
[c]I 4,[5],12:i:-	10	2.16	0.16
Montevideo	8	1.73	0.12
Schwarzengrund	6	1.30	0.09
Senftenberg	6	1.30	0.09
Worthington	6	1.30	0.09
[a]Other serotypes	36	7.79	0.56
[b]Unidentified	4	0.87	0.06
Total serotyped isolates	461	99.78	7.16
Not typed	1	0.22	0.02
*Total positive	462	100	7.18
Total number of analyzed samples	6,439		

Table 1 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Chicken (Broilers)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2010	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	208	45.41	3.05
Enteritidis	124	27.07	1.82
Typhimurium	41	8.95	0.60
Heidelberg	16	3.49	0.23
[c]I 4,[5],12:i:-	10	2.18	0.15
Johannesburg	6	1.31	0.09
Schwarzengrund	5	1.09	0.07
Senftenberg	5	1.09	0.07
Berta	4	0.87	0.06
Braenderup	4	0.87	0.06
Thompson	4	0.87	0.06
[a]Other serotypes	24	5.24	0.35
[b]Unidentified	5	1.09	0.07
Total serotyped isolates	456	.99	6.68
Not typed	2	.44	0.03
*Total positive	458	100	6.71
Total number of analyzed samples	6,828		

Table 1 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Chicken (Broilers)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2011	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	169	51.84	3.33
Enteritidis	75	23.01	1.48
[d]Typhimurium	21	6.44	0.41
Infantis	12	3.68	0.24
Heidelberg	9	2.76	0.18
Johannesburg	5	1.53	0.10
[c]I 4,[5],12:i:-	5	1.53	0.10
[c]8,20:-:z6	3	0.92	0.06
Mbandaka	3	0.92	0.06
Berta	2	0.61	0.04
Braenderup	2	0.61	0.04
Brandenburg	2	0.61	0.04
Litchfield	2	0.61	0.04
Senftenberg	2	0.61	0.04
Thompson	2	0.61	0.04
[a]Other serotypes	7	2.15	0.14
[b]Unidentified	5	1.53	0.10
Total serotyped isolates	326	96.32	6.42
Not typed	0	0.00	0.00
*Total positive	326	100.00	6.42
Total number of analyzed samples	5076		

Table 1 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Chicken (Broilers)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2012	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	228	48.41	2.09
Enteritidis	92	19.53	0.84
Typhimurium	41	8.70	0.38
Thompson	21	4.46	0.19
Infantis	19	4.03	0.17
Heidelberg	16	3.40	0.15
[c]I 4,[5],12:i:-	14	2.97	0.13
Schwarzengrund	8	1.70	0.07
Montevideo	5	1.06	0.05
Hadar	4	0.85	0.04
Mbandaka	4	0.85	0.04
Other serotypes	19	4.03	0.17
Unidentified isolates	0	0.00	0.00
Total serotyped isolates	471	100	4.31
Not typed	0	0	0.00
*Total positive isolates	471	100	4.31
Total number of analyzed samples	10933		

Table 1 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Chicken (Broilers)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2013	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	219	50.34	1.97
Enteritidis	58	13.33	0.52
Typhimurium	45	10.34	0.40
Infantis	23	5.29	0.21
Schwarzengrund	21	4.83	0.19
Heidelberg	18	4.14	0.16
[c]I 4,[5],12:i:-	17	3.91	0.15
Thompson	13	2.99	0.12
Montevideo	3	0.69	0.03
Newport	2	0.46	0.02
Muenchen	2	0.46	0.02
Mbandaka	2	0.46	0.02
Litchfield	2	0.46	0.02
[a]Other serotypes	10	2.30	0.03
[b]Unidentified isolates	1	0.23	.01
Total serotyped isolates	435	100	3.91
Not typed	0	0	0
*Total positive isolates	435	100	3.91
Total number of analyzed samples	11123		

*The percentages listed for total positive isolates may not equal the sum of the data in the Percent of Analyzed Samples column due to rounding.
[a]The ten most commonly isolated serotypes during a listed year are identified by name while less commonly identified serotypes are included in the "other serotypes" category. When there is more than one serotype in tenth place, all serotypes in tenth place are listed.
[b]The "unidentified" designation includes isolates for which a single specific serotype could not be determined including rough, and/or nonmotile.
[c]Prior to 2004, FSIS classified serotypes identified solely by antigenic formulas as monophasic, such as I 4, [5],12:i:-, and included them in the unidentified isolates category.

Of note: The figures display the percent of the isolates identified out of total isolates serotyped for each product class. The y axis, the serotype percentage, varies from graph to graph because the percent of different serotypes varies by commodity and year.

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Table 2
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
*Market Hogs
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 1998	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Derby	13	20.63	0.94
Typhimurium var. Copenhagen	10	15.87	0.72
Agona	5	7.94	0.36
Schwarzengrund	4	6.35	0.29
Heidelberg	3	4.76	0.22
London	3	4.76	0.22
Muenchen	3	4.76	0.22
Brandenburg	2	3.17	0.14
Hadar	2	3.17	0.14
Infantis	2	3.17	0.14
Typhimurium	2	3.17	0.14
Worthington	2	3.17	0.14
[a]Other serotypes	11	17.46	0.79
[b]Unidentified isolates	1	1.59	0.07
Total serotyped isolates	63	.78	4.53
Not typed	18		1.29
Total positive	81		5.83
Total number of analyzed samples	1,390		

Table 2 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
*Market Hogs
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 1999	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Derby	40	28.99	2.08
Typhimurium var. Copenhagen	11	7.97	0.57
Heidelberg	8	5.80	0.42
Anatum	7	5.07	0.36
Infantis	7	5.07	0.36
Johannesburg	7	5.07	0.36
Uganda	7	5.07	0.36
Agona	5	3.62	0.26
Manhattan	5	3.62	0.26
Reading	5	3.62	0.26
[a]Other serotypes	33	23.91	1.72
[b]Unidentified isolates	3		0.16
Total serotyped isolates	138		7.18
Not typed	51		2.65
Total positive	189		9.83
Total number of analyzed samples	1,923		

Table 2 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
*Market Hogs
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2000	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Derby	66	22.60	1.28
Typhimurium var. Copenhagen	47	16.10	0.91
Johannesburg	24	8.22	0.46
Infantis	20	6.85	0.39
Heidelberg	17	5.82	0.33
Anatum	10	3.42	0.19
Typhimurium	9	3.08	0.17
Minnesota	8	2.74	0.15
Brandenburg	7	2.40	0.14
Manhattan	7	2.40	0.14
Reading	7	2.40	0.14
Saintpaul	7	2.40	0.14
Senftenberg	7	2.40	0.14
[a]Other serotypes	51	17.47	0.99
[b]Unidentified isolates	5	1.71	0.10
Total serotyped isolates	292		5.65
Not typed	31		0.60
Total positive	323		6.25
Total number of analyzed samples	5,170		

Table 2 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
*Market Hogs
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2001	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Derby	101	33.01	1.25
Infantis	26	8.50	0.32
Anatum	22	7.19	0.27
Typhimurium var. Copenhagen	21	6.86	0.26
Saintpaul	14	4.58	0.17
Heidelberg	13	4.25	0.16
Reading	13	4.25	0.16
Johannesburg	11	3.59	0.14
Uganda	10	3.27	0.12
Typhimurium	9	2.94	0.11
[a]Other serotypes	63	20.59	0.78
[b]Unidentified isolates	3	0.98	0.04
Total serotyped isolates	306		3.78
Not typed	1		0.01
Total positive	307		3.79
Total number of analyzed samples	8,090		

Table 2—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
*Market Hogs
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2002	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Derby	72	30.38	0.96
Typhimurium var. Copenhagen	31	13.08	0.41
Infantis	14	5.91	0.19
Saintpaul	14	5.91	0.19
Anatum	13	5.49	0.17
Reading	8	3.38	0.11
Heidelberg	7	2.95	0.09
Johannesburg	7	2.95	0.09
Typhimurium	7	2.95	0.09
Uganda	7	2.95	0.09
[a]Other serotypes	57	24.05	0.76
[b]Unidentified isolates	0		
Total serotyped isolates	237		3.17
Not typed	0		
Total positive	237		3.17
Total number of analyzed samples	7,479		

Table 2 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
*Market Hogs
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2003	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Derby	26	17.22	0.44
Typhimurium var. Copenhagen	16	10.60	0.27
Infantis	11	7.28	0.19
Heidelberg	10	6.62	0.17
Saintpaul	8	5.30	0.14
Anatum	8	5.30	0.14
Johannesburg	7	4.64	0.12
Typhimurium	6	3.97	0.10
Reading	5	3.31	0.08
Uganda	4	2.65	0.07
Adelaide	4	2.65	0.07
Brandenburg	4	2.65	0.07
[a]Other serotypes	38	25.17	0.64
[b]Unidentified isolates	4	2.65	0.07
Total serotyped isolates	151		2.55
Not typed	0		
Total positive	151		2.55
Total number of analyzed samples	5,924		

Table 2—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
*Market Hogs
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2004	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Derby	70	28.34	0.89
Typhimurium var. Copenhagen	42	17.00	0.53
Anatum	27	10.93	0.34
Infantis	19	7.69	0.24
Adelaide	10	4.05	0.13
Johannesburg	9	3.64	0.11
Reading	8	3.24	0.10
Mbandaka	6	2.43	0.08
Muenchen	5	2.02	0.06
Agona	4	1.62	0.05
Brandenburg	4	1.62	0.05
Choleraesuis var. Kunzendorf	4	1.62	0.05
Hadar	4	1.62	0.05
Heidelberg	4	1.62	0.05
Typhimurium	4	1.62	0.05
[a]Other serotypes	24	9.72	0.31
[b]Unidentified isolates	3	1.21	0.04
Total serotyped isolates	247		3.14
Not typed	0		
Total positive	247		3.14
Total number of analyzed samples	7,860		

Table 2—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
*Market Hogs
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2005	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Derby	73	29.80	1.10
Typhimurium	33	13.47	0.50
Infantis	22	8.98	0.33
Anatum	13	5.31	0.20
Saintpaul	11	4.49	0.17
Reading	10	4.08	0.15
Johannesburg	9	3.67	0.14
London	9	3.67	0.14
Adelaide	8	3.27	0.12
Heidelberg	6	2.45	0.09
[a]Other serotypes	50	20.41	0.75
[b]Unidentified isolates	1	0.41	0.02
Total serotyped isolates	245		3.69
Not typed	1		0.02
Total positive	246		3.70
Total number of analyzed samples	6,648		

Table 2 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
*Market Hogs
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2006	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Derby	54	18.49	0.75
Anatum	63	21.58	0.87
Johannesburg	28	9.59	0.39
Typhimurium	24	8.22	0.33
Infantis	16	5.48	0.22
Saintpaul	16	5.48	0.22
Heidelberg	13	4.45	0.18
Agona	10	3.42	0.14
Hadar	10	3.42	0.14
Manhattan	7	2.40	0.10
[a]Other serotypes	50	17.12	0.69
[b]Unidentified	1	0.34	0.01
Total serotyped isolates	292		4.03
Not typed	0		
Total positive	292		4.03
Total number of analyzed samples	7,242		

Table 2 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
*Market Hogs
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2007	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
[c]Typhimurium	42	20.69	0.57
Derby	27	13.30	0.37
Johannesburg	20	9.85	0.27
Infantis	17	8.37	0.23
Anatum	13	6.40	0.18
Saintpaul	13	6.40	0.18
Adelaide	10	4.93	0.14
London	10	4.93	0.14
Agona	8	3.94	0.11
Hadar	8	3.94	0.11
[a]Other serotypes	32	15.76	0.44
[b]Unidentified	3	1.48	0.04
Total serotyped isolates	203		2.78
Not typed	0		
Total positive	203		2.78
Total number of analyzed samples	7,308		

Table 2 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
*Market Hogs
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2008	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Derby	23	21.10	0.54
Infantis	14	12.84	0.33
Typhimurium	11	10.09	0.26
Saintpaul	7	6.42	0.16
Agona	6	5.50	0.14
Anatum	6	5.50	0.14
London	6	5.50	0.14
Johannesburg	5	4.59	0.12
Ohio	4	3.67	0.09
Hadar	3	2.75	0.07
[a]Other serotypes	24	22.02	0.57
[b]Unidentified	0		
Total serotyped isolates	109		2.57
Not typed	0		
Total positive	109		2.57
Total number of analyzed samples	4,244		

Table 2 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
*Market Hogs
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2009	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Derby	21	19.44	0.44
[c]Typhimurium	18	16.67	0.38
Johannesburg	10	9.26	0.21
Infantis	8	7.41	0.17
Anatum	6	5.56	0.13
Adelaide	5	4.63	0.11
Agona	5	4.63	0.11
Bredeney	4	3.70	0.08
Heidelberg	4	3.70	0.08
Saintpaul	4	3.70	0.08
[a]Other serotypes	23	21.30	0.48
[b]Unidentified	0		
Total serotyped isolates	108		2.28
Not typed	0		
*Total positive	108		2.28
Total number of analyzed samples	4,747		

Table 2 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
*Market Hogs
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2010	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Derby	17	16.83	0.40
[c]Typhimurium	13	12.87	0.31
Saintpaul	11	10.89	0.26
Infantis	8	7.92	0.19
Adelaide	7	6.93	0.17
Johannesburg	7	6.93	0.17
London	6	5.94	0.14
Heidelberg	5	4.95	0.12
Agona	4	3.96	0.09
Anatum	3	2.97	0.07
Cerro	3	2.97	0.07
Choleraesuis	3	2.97	0.07
[a]Other serotypes	11	10.89	0.26
[b]Unidentified	3	2.97	0.07
Total serotyped isolates	101		2.39
Not typed	0		
*Total positive	101		2.39
Total number of analyzed samples	4,224		

Table 2 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Market Hogs
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2011	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Adelaide	13	18.84	0.53
Johannesburg	12	17.39	0.49
Derby	10	14.49	0.41
Infantis	9	13.04	0.36
Anatum	9	13.04	0.36
[c]Typhimurium	5	7.25	0.20
Ohio	4	5.80	0.16
Uganda	3	4.35	0.12
Agona	2	2.90	0.08
Muenchen	2	2.90	0.08
[a]Other serotypes	13	15.66	0.53
[b]Unidentified	1	1.20	0.04
Total serotyped isolates	83	100	3.36
Not typed	0	0	0.00
*Total positive	83	100	3.36
Total number of analyzed samples	2,468		

Table 2 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Market Hogs
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2012	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
St. Paul	1	100	1.28
[a]Other serotypes	0	0	0
[b]Unidentified	0	0	0
Total serotyped isolates	1	100	1.28
Not typed	0	0	0.00
*Total positive	1	100	1.28
Total number of analyzed samples	78		

*The percentages listed for total positive isolates may not equal the sum of the data in the Percent of Analyzed Samples column due to rounding.
[a]The ten most commonly isolated serotypes during a listed year are identified by name while less commonly identified serotypes are included in the "other serotypes" category. When there is more than one serotype in tenth place, all serotypes in tenth place are listed.
[b]The "unidentified" designation includes isolates for which a single specific serotype could not be determined including rough, and/or nonmotile.
[c]Prior to 2004, FSIS classified serotypes identified solely by antigenic formulas as monophasic, such as I 4, [5],12:i:-, and included them in the unidentified isolates category.
**Sampling sets scheduling suspended for this product class in 2012.

Of note: The figures display the percent of the isolates identified out of total isolates serotyped for each product class. The y axis, the serotype percentage, varies from graph to graph because the percent of different serotypes varies by commodity and year.

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Table 3
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
****Cows/Bulls**
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 1998	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Derby	1	50.00	0.56
Muenchen	1	50.00	0.56
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	2		1.12
Not typed	0		
*Total positive	2		1.12
Total number of analyzed samples	179		

Table 3
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
****Cows/Bulls**
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 1999	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	4	14.29	0.26
Muenster	4	14.29	0.26
Montevideo	3	10.71	0.20
Typhimurium	3	10.71	0.20
Typhimurium var. Copenhagen	2	7.14	0.13
Anatum	1	3.57	0.07
Berta	1	3.57	0.07
Derby	1	3.57	0.07
Give	1	3.57	0.07
Litchfield	1	3.57	0.07
London	1	3.57	0.07
Mbandaka	1	3.57	0.07
Meleagridis	1	3.57	0.07
Newport	1	3.57	0.07
[a]Other serotypes	0		
[b]Unidentified isolates	3	10.71	0.20
Total serotyped isolates	28		1.84

Serotypes 1999	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Not typed	5		0.33
*Total positive	33		2.17
Total number of analyzed samples	1,521		

Table 3—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Cows/Bulls
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2000	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Newport	6	15.00	0.30
Muenster	5	12.50	0.25
Montevideo	4	10.00	0.20
Typhimurium	4	10.00	0.20
Kentucky	3	7.50	0.15
Meleagridis	3	7.50	0.15
Typhimurium var. Copenhagen	3	7.50	0.15
Albany	1	2.50	0.05
Cerro	1	2.50	0.05
Derby	1	2.50	0.05
Dublin	1	2.50	0.05
Fresno	1	2.50	0.05
Infantis	1	2.50	0.05
London	1	2.50	0.05
Mbandaka	1	2.50	0.05
Muenchen	1	2.50	0.05
Reading	1	2.50	0.05
Schwarzengrund	1	2.50	0.05
[a]Other serotypes	0		
[b]Unidentified isolates	1	2.50	0.05
Total serotyped isolates	40		2.01
Not typed	3		0.15
*Total positive	43		2.16
Total number of analyzed samples	1,995		

Table 3—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
****Cows/Bulls**
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2001	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	7	13.46	0.32
Anatum	5	9.62	0.23
Kentucky	5	9.62	0.23
Typhimurium	4	7.69	0.18
Dublin	3	5.77	0.14
Newport	3	5.77	0.14
Albany	2	3.85	0.09
Heidelberg	2	3.85	0.09
Mbandaka	2	3.85	0.09
Meleagridis	2	3.85	0.09
Newbrunswick (Give var. 15+)	2	3.85	0.09
Reading	2	3.85	0.09
Typhimurium var. Copenhagen	2	3.85	0.09
[a]Other serotypes	10	19.23	0.46
[b]Unidentified isolates	1	1.92	0.05
Total serotyped isolates	52		2.39
Not typed	1		0.05
*Total positive	53		2.44
Total number of analyzed samples	2,176		

Table 3—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
****Cows/Bulls**
(1998–2005 'A' Set Samples; 2006–2013 All Samples

Serotypes 2002	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Newport	18	24.66	0.41
Muenster	8	10.96	0.18
Agona	5	6.85	0.11
Kentucky	5	6.85	0.11
Typhimurium	5	6.85	0.11
Infantis	4	5.48	0.09
Montevideo	4	5.48	0.09
Derby	3	4.11	0.07
Mbandaka	3	4.11	0.07
Reading	3	4.11	0.07
[a]Other serotypes	14	19.18	0.32
[b]Unidentified isolates	1	1.37	0.02
Total serotyped isolates	73		1.65
Not typed	0		
*Total positive	73		1.65
Total number of analyzed samples	4,414		

Table 3—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Cows/Bulls
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2003	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Muenster	7	18.42	0.27
Newport	5	13.16	0.19
Typhimurium var. Copenhagen	5	13.16	0.19
Typhimurium	3	7.89	0.12
Cerro	3	7.89	0.12
Agona	2	5.26	0.08
Derby	2	5.26	0.08
Give	2	5.26	0.08
Meleagridis	2	5.26	0.08
Anatum	1	2.63	0.04
Cubana	1	2.63	0.04
Havana	1	2.63	0.04
Infantis	1	2.63	0.04
Montevideo	1	2.63	0.04
Newbrunswick	1	2.63	0.04
Soerenga	1	2.63	0.04
[a]Other serotypes	6	15.79	0.23
[b]Unidentified isolates	0		
Total serotyped isolates	38		1.46
Not typed	0		
*Total positive	38		1.46
Total number of analyzed samples	2,599		

Table 3—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Cows/Bulls
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2004	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Cerro	2	8.33	0.06
Derby	2	8.33	0.06
Dublin	2	8.33	0.06
Muenster	2	8.33	0.06
Newport	2	8.33	0.06
Typhimurium	2	8.33	0.06
Agona	1	4.17	0.03
Anatum	1	4.17	0.03
Brandenburg	1	4.17	0.03
Infantis	1	4.17	0.03
Johannesburg	1	4.17	0.03
Livingston	1	4.17	0.03
London	1	4.17	0.03
Meleagridis	1	4.17	0.03
Montevideo	1	4.17	0.03
Muenchen	1	4.17	0.03
Typhimurium var. Copenhagen	1	4.17	0.03
[a]Other serotypes	0		
[b]Unidentified isolates	1	4.17	0.03
Total serotyped isolates	24		0.76
Not typed	0		
*Total positive	24		0.76
Total number of analyzed samples	3,175		

Table 3—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Cows/Bulls
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2005	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	3	11.54	0.15
Typhimurium	3	11.54	0.15
Agona	2	7.69	0.10
Anatum	2	7.69	0.10
Cerro	2	7.69	0.10
Infantis	2	7.69	0.10
Kentucky	2	7.69	0.10
Muenster	2	7.69	0.10
Bareilly	1	3.85	0.05
Bovismorbificans	1	3.85	0.05
Derby	1	3.85	0.05
Dublin	1	3.85	0.05
Hadar	1	3.85	0.05
Meleagridis	1	3.85	0.05
Newport	1	3.85	0.05
Panama	1	3.85	0.05
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	26		1.33
Not typed	0		
*Total positive	26		1.33
Total number of analyzed samples	1,949		

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Table 3 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Cows/Bulls
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2006	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	4	21.05	0.18
Montevideo	3	15.79	0.13
Agona	2	10.53	0.09
Muenster	2	10.53	0.09
Cerro	1	5.26	0.04
Dublin	1	5.26	0.04
Enteritidis	1	5.26	0.04
Heidelberg	1	5.26	0.04
Mbandaka	1	5.26	0.04
Meleagridis	1	5.26	0.04
Muenchen	1	5.26	0.04
Newport	1	5.26	0.04
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	19		0.85
Not typed	0		
*Total positive	19		0.85
Total number of analyzed samples	2,246		

Table 3 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Cows/Bulls
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2007	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Anatum	7	16.67	0.18
Newport	7	16.67	0.18
Cerro	5	11.90	0.13
Montevideo	4	9.52	0.10
Muenster	4	9.52	0.10
Infantis	2	4.76	0.05
Typhimurium	2	4.76	0.05
[c]3.10:e,h:-	1	2.38	0.03
[c]6,7:z10:-	1	2.38	0.03
Enteritidis	1	2.38	0.03
Gaminara	1	2.38	0.03
Kentucky	1	2.38	0.03
Mbandaka	1	2.38	0.03
Meleagridis	1	2.38	0.03
Miami	1	2.38	0.03
Muenchen	1	2.38	0.03
Saintpaul	1	2.38	0.03
[a]Other serotypes	0		
[b]Unidentified isolates	1	2.38	0.03
Total serotyped isolates	42		1.07
Not typed	0		
*Total positive	42		1.07
Total number of analyzed samples	3,918		

Table 3 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Cows/Bulls
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2008	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Agona	2	16.67	0.09
Cerro	2	16.67	0.09
Montevideo	2	16.67	0.09
Anatum var. 15+	1	8.33	0.04
Hadar	1	8.33	0.04
Kentucky	1	8.33	0.04
London	1	8.33	0.04
Muenster	1	8.33	0.04
Newport	1	8.33	0.04
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	12		0.52
Not typed	0		
*Total positive	12		0.52
Total number of analyzed samples	2,301		

Table 3 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Cows/Bulls
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2009	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	3	25.00	0.15
Give	2	16.67	0.10
Newport	2	16.67	0.10
[c]6,7:k:-	1	8.33	0.05
Agona	1	8.33	0.05
Kentucky	1	8.33	0.05
Mbandaka	1	8.33	0.05
Uganda	1	8.33	0.05
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	12		0.59

Serotypes 2009	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Not typed	0		
*Total positive	12		0.59
Total number of analyzed samples	2,036		

Table 3 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Cows/Bulls
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2010	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	4	44.44	0.23
Bredeney	1	11.11	0.06
Hadar	1	11.11	0.06
Meleagridis	1	11.11	0.06
Senftenberg	1	11.11	0.06
Typhimurium 5-	1	11.11	0.06
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	9		0.51
Not typed	0		
*Total positive	9		0.51
Total number of analyzed samples	1,764		

Table 3 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Cows/Bulls
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2011	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Meleagridis	3	42.86	0.34
Anatum Var. 15+	1	14.29	0.11
Kentucky	1	14.29	0.11
Montevideo	1	14.29	0.11
Norwich	1	14.29	0.11
[a]Other serotypes	0	0	0.00
[b]Unidentified isolates	0	0	0.00
Total serotyped isolates	7	100	0.79
Not typed	0	0	0.00
*Total positive	7	100	0.79
Total number of analyzed samples	882		

*The percentages listed for total positive isolates may not equal the sum of the data in the Percent of Analyzed Samples column due to rounding.
[a]The ten most commonly isolated serotypes during a listed year are identified by name while less commonly identified serotypes are included in the “other serotypes” category. When there is more than one serotype in tenth place, all serotypes in tenth place are listed.
[b]The “unidentified” designation includes isolates for which a single specific serotype could not be determined including rough, and/or nonmotile.
[c]Prior to 2004, FSIS classified serotypes identified solely by antigenic formulas as monophasic, such as I 4, [5],12:i:-, and included them in the unidentified isolates category.
**Sample sets scheduling suspended for this product class in 2011.

Of note: The figures display the percent of the isolates identified out of total isolates serotyped for each product class. The y axis, the serotype percentage, varies from graph to graph because the percent of different serotypes varies by commodity and year.

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Table 4
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Steers/Heifers
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 1998	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
*Total positive	0		
Total number of analyzed samples	214		

Table 4—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Steers/Heifers
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 1999	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Heidelberg	1	50.00	0.13
Panama	1	50.00	0.13
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	2		0.26
Not typed	0		
*Total positive	2		0.26
Total number of analyzed samples	782		

Table 4—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Steers/Heifers
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2000	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	2	50.00	0.18
Minnesota	1	25.00	0.09
Typhimurium var. Copenhagen	1	25.00	0.09
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	4		0.37
Not typed	0		
*Total positive	4		0.37
Total number of analyzed samples	1,092		

Table 4—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Steers/Heifers
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2001	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Derby	4	36.36	0.24
Dublin	2	18.18	0.12
Cerro	1	9.09	0.06
Heidelberg	1	9.09	0.06
Kentucky	1	9.09	0.06
Montevideo	1	9.09	0.06
Saintpaul	1	9.09	0.06
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	11		0.65
Not typed	0		
Total positive	11		0.65
Total number of analyzed samples	1,695		

Table 4—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Steers/Heifers
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2002	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Reading	3	21.43	0.07
Agona	2	14.29	0.04
Kentucky	2	14.29	0.04
Braenderup	1	7.14	0.02
Derby	1	7.14	0.02
Heidelberg	1	7.14	0.02
Montevideo	1	7.14	0.02
Muenster	1	7.14	0.02
Sandiego	1	7.14	0.02
[a]Other serotypes	0		
[b]Unidentified isolates	1	7.14	0.02
Total serotyped isolates	14		0.31
Not typed	0		
Total positive	14		0.31
Total number of analyzed samples	4,572		

Table 4—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Steers/Heifers
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2003	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Derby	3	15.79	0.07
Kentucky	2	10.53	0.04
Montevideo	2	10.53	0.04
Anatum	2	10.53	0.04
Oranienburg	2	10.53	0.04
Heidelberg	1	5.26	0.02
Bovismorbificans	1	5.26	0.02
Dublin	1	5.26	0.02
Mbandaka	1	5.26	0.02
Muenchen	1	5.26	0.02
Newport	1	5.26	0.02
Ohio	1	5.26	0.02
Uganda	1	5.26	0.02
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	19		0.42
Not typed	0		
Total positive	19		0.42
Total number of analyzed samples	4,480		

Table 4—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Steers/Heifers
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2004	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Derby	4	33.33	0.09
[c] 6,8:-:1,2	1	8.33	0.02
Anatum	1	8.33	0.02
Dublin	1	8.33	0.02
Indiana	1	8.33	0.02
Infantis	1	8.33	0.02
Newport	1	8.33	0.02
Senftenberg	1	8.33	0.02
Typhimurium	1	8.33	0.02
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	12		0.28
Not typed	0		
Total positive	12		0.28
Total number of analyzed samples	4,227		

Table 4—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Steers/Heifers
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2005	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Dublin	2	16.67	0.10
Muenchen	2	16.67	0.10
Paratyphi B var. L-tartrate+	2	16.67	0.10
Poona	2	16.67	0.10
Gaminara	1	8.33	0.05
Havana	1	8.33	0.05
Muenster	1	8.33	0.05
Newport	1	8.33	0.05
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	12		0.57
Not typed	0		
Total positive	12		0.57
Total number of analyzed samples	2,090		

Table 4—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Steers/Heifers
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2006	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Newport	2	20.00	0.05
Adelaide	1	10.00	0.03
Anatum var. 15+,34+	1	10.00	0.03
Bere	1	10.00	0.03
Montevideo	1	10.00	0.03
Muenster	1	10.00	0.03
Reading	1	10.00	0.03
Saintpaul	1	10.00	0.03
Typhimurium	1	10.00	0.03
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	10		0.27
Not typed	0		
Total positive	10		0.27
Total number of analyzed samples	3,674		

Table 4
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Steers/Heifers
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2007	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Dublin	2	22.22	0.05
Anatum	1	11.11	0.02
Give var. 15+	1	11.11	0.02
Infantis	1	11.11	0.02
Kentucky	1	11.11	0.02
Montevideo	1	11.11	0.02
Newport	1	11.11	0.02
[a]Other serotypes	0	11.11	0.02
[b]Unidentified isolates	1	11.11	0.02
Total serotyped isolates	9		0.20
Not typed	0		
Total positive	9		0.20

Serotypes 2007	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Total number of analyzed samples	4,406		

Table 4 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Steers/Heifers
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2008	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Dublin	2	22.22	0.04
Typhimurium	2	22.22	0.04
Anatum	1	11.11	0.02
Mbandaka	1	11.11	0.02
Montevideo	1	11.11	0.02
Newport	1	11.11	0.02
[a]Other serotypes	0		
[b]Unidentified isolates	1	11.11	0.02
Total serotyped isolates	9		0.18
Not typed	0		
Total positive	9		0.18
Total number of analyzed samples	4,965		

Table 4—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Steers/Heifers
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2009	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Bareilly	1	10.00	0.02
Give	1	10.00	0.02
[c]III_61:-:1,5,7	1	10.00	0.02
Montevideo	1	10.00	0.02
Muenchen	1	10.00	0.02
Muenster	1	10.00	0.02
Poona	1	10.00	0.02
Typhimurium	1	10.00	0.02

Serotypes 2009	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
[a]Other serotypes	0		
[b]Unidentified isolates	2	20.00	0.04
Total serotyped isolates	10		0.20
Not typed	0		
Total positive	10		0.20
Total number of analyzed samples	4,939		

Table 4—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Steers/Heifers
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2010	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Anatum	3	50.00	0.06
Adelaide	1	16.67	0.02
Derby	1	16.67	0.02
Montevideo	1	16.67	0.02
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	6		0.12
Not typed	0		
Total positive	6		0.12
Total number of analyzed samples	4,918		

Table 4—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Steers/Heifers
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2011	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Agona	2	16.67	0.07
Infantis	2	16.67	0.07
Uganda_var._15+	2	16.67	0.07
Anatum	1	8.33	0.03
Dublin	1	8.33	0.03
Kiambu	1	8.33	0.03
Minnesota	1	8.33	0.03
Muenster	1	8.33	0.03
Newport	1	8.33	0.03
[a]Other serotypes	0	0.00	0.00
[b]Unidentified isolates	1	7.69	0.03
Total serotyped isolates	13	100	0.45
Not typed	0	0	0.00
Total positive	13	100	0.45
Total number of analyzed samples	2,893		

Table 4 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
**Steers/Heifers
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2012	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
[c]4,[5],12:i:-	1	33.33	0.37
Hadar	1	33.33	0.37
Dublin	1	33.33	0.37
[a]Other serotypes	0	0.00	0.00
[b]Unidentified isolates	0	0	0.03
Total serotyped isolates	3	100	1.12
Not typed	0	0	0.00
Total positive	3	100	1.12
Total number of analyzed samples		269	

*The percentages listed for total positive isolates may not equal the sum of the data in the Percent of Analyzed Samples column due to rounding.

[a]The ten most commonly isolated serotypes during a listed year are identified by name while less commonly identified serotypes are included in the “other serotypes” category. When there is more than one serotype in tenth place, all serotypes in tenth place are listed.
[b]The “unidentified” designation includes isolates for which a single specific serotype could not be determined including rough, and/or nonmotile.
[c]Prior to 2004, FSIS classified serotypes identified solely by antigenic formulas as monophasic, such as I 4, [5],12:i:-, and included them in the unidentified isolates category.
**Sample sets scheduling suspended for this product class in 2012.

Of note: The figures display the percent of the isolates identified out of total isolates serotyped for each product class. The y axis, the serotype percentage, varies from graph to graph because the percent of different serotypes varies by commodity and year.

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Table 5
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Beef
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 1998	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Anatum	13	18.06	1.00
Montevideo	9	12.50	0.69
Meleagridis	7	9.72	0.54
Muenster	7	9.72	0.54
Hadar	4	5.56	0.31
Typhimurium var. Copenhagen	4	5.56	0.31
Infantis	3	4.17	0.23
Kentucky	3	4.17	0.23
Newport	3	4.17	0.23
Reading	3	4.17	0.23
[a]Other serotypes	15	20.83	1.16
[b]Unidentified isolates	1	1.39	0.08
Total serotyped isolates	72		5.56
Not typed	11		0.85
*Total positive	83		6.40
Total number of analyzed samples	1,296		

Table 5-Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Beef
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 1999	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	148	22.77	0.90
Anatum	70	10.77	0.43
Muenster	46	7.08	0.28
Typhimurium	36	5.54	0.22
Cerro	32	4.92	0.20
Kentucky	31	4.77	0.19
Mbandaka	28	4.31	0.17
Typhimurium var. Copenhagen	28	4.31	0.17
Meleagridis	23	3.54	0.14
Newport	21	3.23	0.13
[a]Other serotypes	180	27.69	1.10
[b]Unidentified isolates	7	1.08	0.04
Total serotyped isolates	650		3.97
Not typed	60		0.37
*Total positive	710		4.34
Total number of analyzed samples	16,375		

Table 5—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Beef
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2000	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	131	12.72	0.40
Senftenberg	102	9.90	0.31
Newport	85	8.25	0.26
Typhimurium var. Copenhagen	80	7.77	0.24
Anatum	70	6.80	0.21
Typhimurium	65	6.31	0.20
Cerro	52	5.05	0.16
Muenster	46	4.47	0.14
Mbandaka	45	4.37	0.14
Kentucky	44	4.27	0.13
[a]Other serotypes	287	27.86	0.87
[b]Unidentified isolates	23	2.23	0.07
Total serotyped isolates	1030		3.14
Not typed	50		0.15
*Total positive	1080		3.29
Total number of analyzed samples	32,844		

Table 5-Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Beef
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2001	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	94	14.05	0.39
Newport	73	10.91	0.30
Anatum	62	9.27	0.26
Muenster	52	7.77	0.21
Kentucky	46	6.88	0.19
Typhimurium	37	5.53	0.15
Mbandaka	36	5.38	0.15
Cerro	26	3.89	0.11
Typhimurium var. Copenhagen	25	3.74	0.10
Reading	17	2.54	0.07
[a]Other serotypes	185	27.65	0.76
[b]Unidentified isolates	16	2.39	0.07
Total serotyped isolates	669		2.76
Not typed	17		0.07
*Total positive	686		2.83
Total number of analyzed samples	24,243		

Table 5—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Beef
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2002	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	89	11.32	0.29
Newport	84	10.69	0.27
Anatum	77	9.80	0.25
Muenster	65	8.27	0.21
Agona	52	6.62	0.17
Typhimurium var. Copenhagen	51	6.49	0.16
Kentucky	38	4.83	0.12
Mbandaka	36	4.58	0.12
Typhimurium	32	4.07	0.10
Cerro	30	3.82	0.10
[a]Other serotypes	221	28.12	0.71
[b]Unidentified isolates	11	1.40	0.04
Total serotyped isolates	786		2.54
Not typed	4		0.01
*Total positive	790		2.55
Total number of analyzed samples	30,933		

Table 5—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Beef
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2003	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Newport	54	11.02	0.19
Montevideo	49	10.00	0.17
Anatum	45	9.18	0.15
Agona	29	5.92	0.10
Typhimurium var. Copenhagen	27	5.51	0.09
Typhimurium	27	5.51	0.09
Dublin	26	5.31	0.09
Muenster	24	4.90	0.08
Kentucky	23	4.69	0.08
Mbandaka	22	4.49	0.08
[a]Other serotypes	154	31.43	0.53

Serotypes 2003	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
[b]Unidentified isolates	10	2.04	0.03
Total serotyped isolates	490		1.68
Not typed	0		
*Total positive	490		1.68
Total number of analyzed samples	29,097		

Table 5—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Beef
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2004	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	71	14.06	0.23
Anatum	55	10.89	0.18
Muenster	47	9.31	0.15
Newport	38	7.52	0.12
Agona	36	7.13	0.12
Dublin	25	4.95	0.08
Kentucky	21	4.16	0.07
Typhimurium	21	4.16	0.07
Typhimurium var. Copenhagen	18	3.56	0.06
Mbandaka	17	3.37	0.05
[a]Other serotypes	154	30.50	0.50
[b]Unidentified isolates	2	0.40	0.01
Total serotyped isolates	505		1.63
Not typed	0		
*Total positive	505		1.63
Total number of analyzed samples	30,984		

Table 5—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Beef
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2005	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	30	13.89	0.15
Typhimurium	20	9.26	0.10
Anatum	20	9.26	0.10
Muenster	17	7.87	0.09
Newport	14	6.48	0.07
Mbandaka	12	5.56	0.06
Dublin	9	4.17	0.05
Reading	9	4.17	0.05
Cerro	8	3.70	0.04
Agona	7	3.24	0.04
Give	7	3.24	0.04
Meleagridis	7	3.24	0.04
[a]Other serotypes	53	24.54	0.27
[b]Unidentified isolates	3	1.39	0.02
Total serotyped isolates	216		1.12
Not typed	1		0.01
*Total positive	217		1.12
Total number of analyzed samples	19,365		

Table 5—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Beef
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2006	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	59	16.86	0.33
Muenster	34	9.71	0.19
Anatum	27	7.71	0.15
Newport	24	6.86	0.13
Cerro	22	6.29	0.12
Typhimurium	21	6.00	0.12
Dublin	18	5.14	0.10
Reading	18	5.14	0.10
Mbandaka	14	4.00	0.08
Infantis	13	3.71	0.07
[a]Other serotypes	99	28.29	0.55
[b]Unidentified	1	0.29	0.01
Total serotyped isolates	350		1.96
Not typed	0		
*Total positive	350		1.96
Total number of analyzed samples	17,849		

Table 5 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Beef
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2007	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	86	23.43	0.63
Dublin	36	9.81	0.26
Muenster	28	7.63	0.20
Mbandaka	23	6.27	0.17
Newport	22	5.99	0.16
Typhimurium	19	5.18	0.14
Cerro	18	4.90	0.13
Meleagridis	16	4.36	0.12
Agona	15	4.09	0.11
Anatum	14	3.81	0.10
Infantis	10	2.72	0.07
Kentucky	10	2.72	0.07
[a]Other serotypes	65	17.71	0.47
[b]Unidentified	5	1.36	0.04
Total serotyped isolates	367		2.68
Not typed	0		
*Total positive	367		2.68
Total number of analyzed samples	13,695		

Table 5—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Beef
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2008	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	100	24.51	0.60
Dublin	50	12.25	0.30
Anatum	31	7.60	0.18
Newport	30	7.35	0.18
Typhimurium	27	6.62	0.16
Cerro	21	5.15	0.13
Kentucky	18	4.41	0.11
Mbandaka	17	4.17	0.10
Meleagridis	17	4.17	0.10
Muenster	16	3.92	0.10
[a]Other serotypes	79	19.36	0.47
[b]Unidentified	2	0.49	0.01
Total serotyped isolates	408		2.43
Not typed	0		
*Total positive	408		2.43
Total number of analyzed samples	16,765		

Table 5 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Beef
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2009	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	51	31.10	0.60
Dublin	21	12.80	0.25
Newport	15	9.15	0.18
Typhimurium	14	8.54	0.16
Cerro	8	4.88	0.09
Kentucky	8	4.88	0.09
Meleagridis	8	4.88	0.09
Anatum	5	3.05	0.06
Muenchen	5	3.05	0.06
[a]Other serotypes	19	11.59	0.22
[b]Unidentified	4	2.44	0.05
Total serotyped isolates	164		1.92
Not typed	0		
*Total positive	164		1.92
Total number of analyzed samples	8,541		

Table 5 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Beef
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2010	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	52	25.62	0.56
Dublin	38	18.72	0.41
Typhimurium	12	5.91	0.13
Anatum	11	5.42	0.12
Cerro	9	4.43	0.10
Kentucky	9	4.43	0.10
Agona	7	3.45	0.08
Mbandaka	6	2.96	0.06
Meleagridis	5	2.46	0.05
Newport	5	2.46	0.05
[a]Other serotypes	42	20.69	0.45
[b]Unidentified	6	2.96	0.06
Total serotyped isolates	202		2.18
Not typed	1	0.49	0.01
*Total positive	203		2.19
Total number of analyzed samples	9,257		

Table 5 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Beef
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2011	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	99	39.60	0.71
Dublin	35	14.00	0.25
Muenster	22	8.80	0.16
Kentucky	17	6.80	0.12
Anatum	16	6.40	0.12
Cerro	14	5.60	0.10
Infantis	14	5.60	0.10
Newport	12	4.80	0.09
Meleagridis	11	4.40	0.08
Typhimurium	10	4.00	0.07
[a]Other serotypes	72	22.02	0.52
[b]Unidentified	5	1.53	0.04
Total serotyped isolates	327	100	2.36
Not typed	0	0	0
*Total positive	327	100	2.36
Total number of analyzed samples	13,884		

Table 5 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Beef
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2012	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	81	39.71	0.32
Dublin	29	14.22	0.11
Typhimurium	16	7.84	0.06
Anatum	15	7.35	0.06
Muenchen	13	6.37	0.05
Cerro	13	6.37	0.05
Meleagridis	12	5.88	0.05
Kentucky	12	5.88	0.05
Muenster	7	3.43	0.03
Newport	6	2.94	0.02
[a]Other serotypes	65	23.81	0.25
[b]Unidentified	4	1.47	0.02
Total serotyped isolates	273	100	1.07
Not typed	0	0	0.00
*Total positive	273	100	1.07
Total number of analyzed samples	14,665		

Table 5 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Beef
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2013	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Montevideo	86	31.05	0.50
Typhimurium	19	6.86	0.11
Meleagridis	18	6.50	0.10
Dublin	18	6.50	0.10
Newport	13	4.69	0.08
Muenchen	12	4.33	0.07
Kentucky	12	4.33	0.07
Cerro	11	3.97	0.06
Anatum	9	3.25	0.05
6,7:G,M,S:E,N,Z15	7	2.53	0.04
Infantis	7	2.53	0.04
Reading	5	1.81	0.03
Panama	5	1.81	0.03
Give	5	1.81	0.03
Mbandaka	5	1.81	0.03
[c]I 4,[5],12:i:-	5	1.81	0.03
Agona	4	1.44	0.02
Muenster	4	1.44	0.02
[a]Other serotypes	32	11.55	0.10
[b]Unidentified	2	0.72	0.01
Total serotyped isolates	277	100	.88
Not typed	0	0	0.00
*Total positive	277	100	.88
Total number of analyzed samples	17,161		

*The percentages listed for total positive isolates may not equal the sum of the data in the Percent of Analyzed Samples column due to rounding.
[a]The ten most commonly isolated serotypes during a listed year are identified by name while less commonly identified serotypes are included in the "other serotypes" category. When there is more than one serotype in tenth place, all serotypes in tenth place are listed.
[b]The "unidentified" designation includes isolates for which a single specific serotype could not be determined including rough, and/or nonmotile.
[c]Prior to 2004, FSIS classified serotypes identified solely by antigenic formulas as monophasic, such as I 4, [5],12:i:-, and included them in the unidentified isolates category.

Of note: The figures display the percent of the isolates identified out of total isolates serotyped for each product class. The y axis, the serotype percentage, varies from graph to graph because the percent of different serotypes varies by commodity and year.

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Table 6
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Chicken
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 1998	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Thompson	1	100.00	4.17
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	1		4.17
Not typed	0		
*Total positive	1		4.17
Total number of analyzed samples	24		

Table 6—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Chicken
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 1999	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	12	27.27	4.04
Heidelberg	7	15.91	2.36
Typhimurium var. Copenhagen	6	13.64	2.02
Typhimurium	5	11.36	1.68
Istanbul	2	4.55	0.67
Reading	2	4.55	0.67
Enteritidis	1	2.27	0.34
Infantis	1	2.27	0.34
Litchfield	1	2.27	0.34
Newington	1	2.27	0.34
Schwarzengrund	1	2.27	0.34
Thompson	1	2.27	0.34
[a]Other serotypes	0		
[b]Unidentified isolates	4	9.09	1.35
Total serotyped isolates	44		14.81

Serotypes 1999	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Not typed	4		1.35
*Total positive	48		16.16
Total number of analyzed samples	297		

Table 6—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Chicken
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2000	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	13	26.53	3.14
Heidelberg	9	18.37	2.17
Typhimurium var. Copenhagen	6	12.24	1.45
Hadar	3	6.12	0.72
Typhimurium	3	6.12	0.72
Infantis	2	4.08	0.48
Newport	2	4.08	0.48
Thompson	2	4.08	0.48
Berta	1	2.04	0.24
Enteritidis	1	2.04	0.24
Reading	1	2.04	0.24
Schwarzengrund	1	2.04	0.24
[a]Other serotypes	0		
[b]Unidentified isolates	5	10.20	1.21
Total serotyped isolates	49		11.84
Not typed	8		1.93
*Total positive	57		13.77
Total number of analyzed samples	414		

Table 6—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Chicken
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2001	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Heidelberg	13	26.00	4.96
Schwarzengrund	10	20.00	3.82
Kentucky	9	18.00	3.44
Typhimurium	5	10.00	1.91
Hadar	2	4.00	0.76
Thompson	2	4.00	0.76
Brandenburg	1	2.00	0.38
Johannesburg	1	2.00	0.38
Ohio	1	2.00	0.38
Typhimurium var. Copenhagen	1	2.00	0.38
[a]Other serotypes	0		
[b]Unidentified isolates	5	10.00	1.91
Total serotyped isolates	50		19.08
Not typed	1		0.38
*Total positive	51		19.47
Total number of analyzed samples	262		

Table 6—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Chicken
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2002	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Heidelberg	37	29.60	8.62
Kentucky	20	16.00	4.66
Typhimurium var. Copenhagen	12	9.60	2.80
Typhimurium	10	8.00	2.33
Enteritidis	6	4.80	1.40
Montevideo	6	4.80	1.40
Hadar	4	3.20	0.93
Schwarzengrund	4	3.20	0.93
Infantis	3	2.40	0.70
Thompson	3	2.40	0.70
[a]Other serotypes	9	7.20	2.10
[b]Unidentified isolates	11	8.80	2.56
Total serotyped isolates	125		29.14
Not typed	0		
*Total positive	125		29.14
Total number of analyzed samples	429		

Table 6—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Chicken
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2003	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	29	27.62	9.80
Heidelberg	27	25.71	9.12
Kentucky	21	20.00	7.09
Thompson	6	5.71	2.03
Infantis	4	3.81	1.35
Montevideo	2	1.90	0.68
Istanbul	2	1.90	0.68
Haardt	2	1.90	0.68
Oranienburg	2	1.90	0.68
Typhimurium var. Copenhagen	1	0.95	0.34
Typhimurium	1	0.95	0.34
Arizona	1	0.95	0.34
Bredeney	1	0.95	0.34
Mbandaka	1	0.95	0.34
Taksony	1	0.95	0.34
[a]Other serotypes	0		
[b]Unidentified isolates	4	3.81	1.35
Total serotyped isolates	105		35.47
Not typed	0		
*Total positive	105		35.47
Total number of analyzed samples	296		

Table 6—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Chicken
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2004	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	50	50.51	12.89
Enteritidis	7	7.07	1.80
Typhimurium	7	7.07	1.80
Heidelberg	6	6.06	1.55
Montevideo	5	5.05	1.29
Schwarzengrund	5	5.05	1.29
Thompson	4	4.04	1.03
[c]I4,[5],12:i:-	3	1.01	0.26
Infantis	2	2.02	0.52
[c] 6,7:k:-	1	1.01	0.26
Agona	1	1.01	0.26
Braenderup	1	1.01	0.26
Hadar	1	1.01	0.26
Havana	1	1.01	0.26
Mbandaka	1	1.01	0.26
Oranienburg	1	1.01	0.26
Senftenberg	1	1.01	0.26
Typhimurium var. Copenhagen	1	1.01	0.26
Uganda	1	1.01	0.26
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	99		25.52
Not typed	0		
*Total positive	99		25.52
Total number of analyzed samples	388		

Table 6—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Chicken
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2005	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Enteritidis	15	31.91	10.34
Kentucky	15	31.91	10.34
Heidelberg	6	12.77	4.14
Typhimurium	3	6.38	2.07
[c] 4,[5],12:i:-	1	2.13	0.69
Alachua	1	2.13	0.69
Hadar	1	2.13	0.69
Kiambu	1	2.13	0.69
Muenster	1	2.13	0.69
Schwarzengrund	1	2.13	0.69
Senftenberg	1	2.13	0.69
Thompson	1	2.13	0.69
[a]Other serotypes	0		
[b]Unidentified isolates	0		
Total serotyped isolates	47		32.41
Not typed	0		
*Total positive	47		32.41
Total number of analyzed samples	145		

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Table 6 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Chicken
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2006	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	42	42.00	18.92
Heidelberg	16	16.00	7.21
Enteritidis	16	16.00	7.21
[c]4,[5],12:i:-	4	4.00	1.80
Typhimurium	4	4.00	1.80
Berta	3	3.00	1.35
Infantis	3	3.00	1.35
Schwarzengrund	3	3.00	1.35
[c]8,(20):z6	1	1.00	0.45
Anatum	1	1.00	0.45
Hadar	1	1.00	0.45
Mbandaka	1	1.00	0.45
Montevideo	1	1.00	0.45
Thompson	1	1.00	0.45
[a]Other serotypes	2	2.00	0.90
[b]Unidentified	3	3.00	1.35
Total serotyped isolates	100		45.05
Not typed	0		
*Total positive	100		45.05
Total number of analyzed samples	222		

Table 6—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Chicken
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2007	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Enteritidis	34	25.56	6.72
Kentucky	33	24.81	6.52
Heidelberg	27	20.30	5.34
[c]4,[5],12:i:-	9	6.76	1.77
Typhimurium	8	6.02	1.58
Infantis	3	2.26	0.59
Thompson	3	2.26	0.59
Minnesota	2	1.50	0.40
Schwarzengrund	2	1.50	0.40
[a]Other serotypes	10	7.52	1.98
[b]Unidentified	2	1.50	0.40
Total serotyped isolates	133		26.28
Not typed	0		
*Total positive	133		26.28
Total number of analyzed samples	506		

Table 6 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Chicken
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2008	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	30	28.57	7.28
Heidelberg	26	24.76	6.31
Enteritidis	21	20.00	5.10
Typhimurium	12	11.43	2.91
[c]4,5,12:i:-	4	3.08	0.97
Infantis	2	1.90	0.49
Montevideo	2	1.90	0.49
[c] 6,7:-:1,5	1	0.95	0.24
[c] 8,20:-:z6	1	0.95	0.24
Berta	1	0.95	0.24
Blockley	1	0.95	0.24
Braenderup	1	0.95	0.24
Hartford	1	0.95	0.24
Kralingen	1	0.95	0.24
Oranienburg	1	0.95	0.24
[a]Other serotypes	0		
[b]Unidentified	0		
Total serotyped isolates	105		25.49
Not typed	0		
*Total positive	105		25.49
Total number of analyzed samples	412		

Table 6 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Chicken
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2009	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	21	30.88	5.61
Enteritidis	20	29.41	5.35
Heidelberg	7	10.29	1.87
[d]Typhimurium	6	7.35	1.34
[c]4,[5],12:i:-	5	7.35	1.34
[c]8,20:-:z6	2	2.94	0.53
Braenderup	2	2.94	0.53
Blockley	1	1.47	0.27
Cerro	1	1.47	0.27
Infantis	1	1.47	0.27
Montevideo	1	1.47	0.27
Schwarzengrund	1	1.47	0.27
[a]Other serotypes	0		
[b]Unidentified	0		
Total serotyped isolates	68		18.18
Not typed	0		
*Total positive	68		18.18
Total number of analyzed samples	374		

Table 6 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Chicken
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2010	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Kentucky	28	35.00	6.57
Enteritidis	24	30.00	5.63
Heidelberg	8	10.00	1.88
[d]Typhimurium	6	7.50	1.41
[c]4,5,12:i:-	5	6.25	1.17
Berta	2	2.50	0.47
[c] 8,20:-:z6	1	1.25	0.23
Hadar	1	1.25	0.23
Infantis	1	1.25	0.23
Montevideo	1	1.25	0.23
Newport	1	1.25	0.23
Ohio	1	1.25	0.23
Thompson	1	1.25	0.23
[a]Other serotypes	0		
[b]Unidentified	0		
Total serotyped isolates	80		18.78
Not typed	0		
*Total positive	80		18.78
Total number of analyzed samples	426		

Table 6 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Chicken
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2011	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Enteritidis	57	36.54	10.84
Kentucky	48	30.77	9.13
Heidelberg	18	11.54	3.42
Typhimurium	10	6.41	1.90
Braenderup	5	3.21	0.95
Infantis	4	2.56	0.76
Mbandaka	4	2.56	0.76
[c]8,20:-:z6	2	1.28	0.38
[c]3,10:e,h:-	1	0.64	0.19
[c]4, [5],12:l:-	1	0.64	0.19
[C]8,20:l:-	1	0.64	0.19
Johannesburg	1	0.64	0.19
Lille	1	0.64	0.19
Newport	1	0.64	0.19
Roodepoort	1	0.64	0.19
[a]Other serotypes	0		
[b]Unidentified	3	1.27	0.38
Total serotyped isolates	158	100	30.04
Not typed	0		
*Total positive	158	100	30.04
Total number of analyzed samples	526		

Table 6 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Chicken
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2012	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Enteritidis	111	30.58	8.07
Kentucky	70	19.28	5.09
Typhimurium	64	17.63	4.65
Heidelberg	62	17.08	4.51
Schwarzengrund	18	4.96	1.31
Infantis	12	3.31	0.87
Thompson	9	2.48	0.65
[c]4,[5],12:i:-	9	2.48	0.65
Montevideo	4	1.10	0.29
Mbandaka	4	1.10	0.29
[a]Other serotypes	22	5.68	1.60
[b]Unidentified	2	0.52	0.15
Total serotyped isolates	387	100	28.13
Not typed			
*Total positive	387	100	28.13
Total number of analyzed samples	1,376		

Table 6 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Chicken
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2013	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Enteritidis	22	27.16	0.07
Kentucky	17	20.99	0.05
Infantis	13	16.05	0.04
Heidelberg	10	12.35	0.03
Typhimurium	8	9.88	0.03
[c]I 4,[5],12:i:-	4	4.94	0.01
Braenderup	2	2.47	0.01
Blockley	1	1.23	0.00
Uganda	1	1.23	0.00
Liverpool	1	1.23	0.00
Thompson	1	1.23	0.00
[a]Other serotypes	1	1.23	0.22
[b]Unidentified			
Total serotyped isolates	81	100	17.88
Not typed			
*Total positive	81	100	17.88
Total number of analyzed samples	453		

*The percentages listed for total positive isolates may not equal the sum of the data in the Percent of Analyzed Samples column due to rounding.

[a]The ten most commonly isolated serotypes during a listed year are identified by name while less commonly identified serotypes are included in the “other serotypes” category. When there is more than one serotype in tenth place, all serotypes in tenth place are listed.
[b]The “unidentified” designation includes isolates for which a single specific serotype could not be determined including rough, and/or nonmotile.
[c]Prior to 2004, FSIS classified serotypes identified solely by antigenic formulas as monophasic, such as I 4, [5],12:i:-, and included them in the unidentified isolates category.

Of note: The figures display the percent of the isolates identified out of total isolates serotyped for each product class. The y axis, the serotype percentage, varies from graph to graph because the percent of different serotypes varies by commodity and year.

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Table 7
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 1998	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	36	19.15	6.09
Heidelberg	35	18.62	5.92
Senftenberg	21	11.17	3.55
Reading	17	9.04	2.88
Schwarzengrund	17	9.04	2.88
Muenster	7	3.72	1.18
Saintpaul	7	3.72	1.18
Anatum	5	2.66	0.85
Kentucky	5	2.66	0.85
Typhimurium	5	2.66	0.85
[a]Other serotypes	32	17.02	5.41
[b]Unidentified isolates	1	0.53	0.17
Total serotyped isolates	188		31.81
Not typed	28		4.74
*Total positive	216		36.55
Total number of analyzed samples	591		

Table 7-Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 1999	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	72	22.15	6.86
Heidelberg	61	18.77	5.81
Senftenberg	27	8.31	2.57
Reading	26	8.00	2.48
Muenster	18	5.54	1.71
Agona	16	4.92	1.52
Saintpaul	13	4.00	1.24
Schwarzengrund	12	3.69	1.14
Typhimurium var. Copenhagen	12	3.69	1.14
Typhimurium	7	2.15	0.67
[a]Other serotypes	54	16.62	5.14
[b]Unidentified isolates	7	2.15	0.67
Total serotyped isolates	325		30.95
Not typed	7		0.67
*Total positive	332		31.62
Total number of analyzed samples	1,050		

Table 7—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2000	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Heidelberg	80	21.33	5.16
Hadar	57	15.20	3.68
Agona	35	9.33	2.26
Senftenberg	31	8.27	2.00
Schwarzengrund	29	7.73	1.87
Reading	22	5.87	1.42
Saintpaul	18	4.80	1.16
Muenster	12	3.20	0.77
Brandenburg	10	2.67	0.64
Arizona	8	2.13	0.52
Muenchen	8	2.13	0.52
[a]Other serotypes	61	16.27	3.93
[b]Unidentified isolates	4	1.07	0.26
Total serotyped isolates	375		24.18
Not typed	24		1.55
*Total positive	399		25.73
Total number of analyzed samples	1,551		

Table 7
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2001	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Heidelberg	33	24.81	6.35
Senftenberg	18	13.53	3.46
Hadar	14	10.53	2.69
Arizona	10	7.52	1.92
Reading	10	7.52	1.92
Agona	8	6.02	1.54
Newport	7	5.26	1.35
Saintpaul	5	3.76	0.96
Schwarzengrund	4	3.01	0.77
Derby	3	2.26	0.58
Typhimurium	3	2.26	0.58
Worthington	3	2.26	0.58
[a]Other serotypes	15	11.28	2.88
[b]Unidentified isolates	0		
Total serotyped isolates	133		25.58
Not typed	3		0.58
*Total positive	136		26.15
Total number of analyzed samples	520		

Table 7—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2002	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Heidelberg	37	19.27	3.44
Reading	24	12.50	2.23
Hadar	23	11.98	2.14
Saintpaul	14	7.29	1.30
Senftenberg	14	7.29	1.30
Arizona	10	5.21	0.93
Newport	10	5.21	0.93
Schwarzengrund	9	4.69	0.84
Uganda	8	4.17	0.74
Typhimurium	5	2.60	0.47
[a]Other serotypes	30	15.63	2.79
[b]Unidentified isolates	8	4.17	0.74
Total serotyped isolates	192		17.86
Not typed	0		
*Total positive	192		17.86
Total number of analyzed samples	1,075		

Table 7
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2003	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Heidelberg	55	21.57	5.48
Hadar	44	17.25	4.38
Arizona	31	12.16	3.09
Reading	28	10.98	2.79
Saintpaul	19	7.45	1.89
Newport	18	7.06	1.79
Senftenberg	11	4.31	1.10
Kentucky	9	3.53	0.90
Schwarzengrund	6	2.35	0.60
Typhimurium	5	1.96	0.50
[a]Other serotypes	24	9.41	2.39
[b]Unidentified isolates	5	1.96	0.50
Total serotyped isolates	255		25.40
Not typed	0		
*Total positive	255		25.40
Total number of analyzed samples	1,004		

Table 7—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2004	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Heidelberg	38	18.27	3.64
Hadar	27	12.98	2.59
Reading	16	7.69	1.53
Derby	15	7.21	1.44
Saintpaul	15	7.21	1.44
Senftenberg	10	4.81	0.96
[c]IIIa 18:z4,z23:-	9	4.33	0.86
Typhimurium	9	4.33	0.86
Schwarzengrund	8	3.85	0.77
Kentucky	6	2.88	0.57
Newport	6	2.88	0.57
[a]Other serotypes	47	22.60	4.50
[b]Unidentified isolates	2	0.96	0.19
Total serotyped isolates	208		19.92
Not typed	0		
*Total positive	208		19.92
Total number of analyzed samples	1,044		

Table 7—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2005	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	44	20.47	4.76
Saintpaul	27	12.56	2.92
Heidelberg	25	11.63	2.70
Reading	18	8.37	1.95
Schwarzengrund	12	5.58	1.30
[c]IIIa 18:z4,z23:-	11	5.12	1.19
Senftenberg	8	3.72	0.86
Agona	7	3.26	0.76
Albany	6	2.79	0.65
Kentucky	5	2.33	0.54
Muenchen	5	2.33	0.54
Newport	5	2.33	0.54
[a]Other serotypes	40	18.60	4.32
[b]Unidentified isolates	2	0.93	0.22
Total serotyped isolates	215		23.24
Not typed	0		
*Total positive	215		23.24
Total number of analyzed samples	925		

Table 7—Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2005 (Variants Combined)[d]	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	44	20.47	4.76
Saintpaul	27	12.56	2.92
Heidelberg	25	11.63	2.70
Reading	18	8.37	1.95
Schwarzengrund	12	5.58	1.30
[c]IIIa 18:z4,z23:-	11	5.12	1.19
Senftenberg	8	3.72	0.86
Agona	7	3.26	0.76
Albany	6	2.79	0.65
Typhimurium	6	2.79	0.65
[a]Other serotypes	40	18.60	4.32
[b]Unidentified isolates	2	0.93	0.22
Total serotyped isolates	215		23.24
Not typed	0		
*Total positive	215		23.24
Total number of analyzed samples	925		

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Table 7 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2006	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	31	34.44	6.98
Saintpaul	8	8.89	1.80
Heidelberg	7	7.78	1.58
Agona	5	5.56	1.13
Anatum	4	4.44	0.90
Kentucky	4	4.44	0.90
Muenchen	4	4.44	0.90
Derby	3	3.33	0.68
Senftenberg	3	3.33	0.68
Typhimurium	3	3.33	0.68
Worthington	3	3.33	0.68
[a]Other serotypes	14	15.56	3.15
[b]Unidentified	1	1.11	0.23
Total serotyped isolates	90		20.27
Not typed	0		
*Total positive	90		20.27
Total number of analyzed samples	444		

Table 7 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2007	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	62	43.36	7.56
Heidelberg	17	11.89	2.07
Saintpaul	13	9.09	1.59
Agona	11	7.69	1.34
Newport	8	5.59	0.98
Reading	6	4.20	0.73
Anatum	2	1.40	0.24
London	2	1.40	0.24
Minnesota	2	1.40	0.24
Muenchen	2	1.40	0.24
Schwarzengrund	2	1.40	0.24
Typhimurium	2	1.40	0.24
Uganda	2	1.40	0.24
[a]Other serotypes	12	8.39	1.46
[b]Unidentified	0		
Total serotyped isolates	143		17.44
Not typed	0		
*Total positive	143		17.44
Total number of analyzed samples	820		

Table 7 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2008	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	35	25.93	4.00
Saintpaul	15	11.11	1.71
[c]III 18:z4,z23:-	14	10.37	1.60
Schwarzengrund	8	5.93	0.91
Newport	7	5.19	0.80
Heidelberg	6	4.44	0.68
Senftenberg	6	4.44	0.68
Agona	5	3.70	0.57
Muenchen	5	3.70	0.57
Worthington	5	3.70	0.57
[a]Other serotypes	28	20.74	3.20
[b]Unidentified	1	0.74	0.11
Total serotyped isolates	135		15.41
Not typed	0		
*Total positive	135		15.41
Total number of analyzed samples	876		

Table 7
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2009	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Saintpaul	17	26.15	2.80
Hadar	14	21.54	2.30
Agona	5	7.69	0.82
Schwarzengrund	5	7.69	0.82
Senftenberg	5	7.69	0.82
Albany	3	4.62	0.49
[c]III 18:z4,z23:-	3	4.62	0.49
Derby	2	3.08	0.33
Heidelberg	2	3.08	0.33
Newport	2	3.08	0.33
[a]Other serotypes	6	9.23	0.99
[b]Unidentified	1	1.54	0.16
Total serotyped isolates	65		10.69
Not typed	0		
*Total positive	65		10.69
Total number of analyzed samples	608		

Table 7 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2010	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	15	16.85	1.72
Saintpaul	15	16.85	1.72
Heidelberg	9	10.11	1.03
[c]III 18:z4,z23:-	9	7.89	0.80
Albany	8	8.99	0.92
Schwarzengrund	6	6.74	0.69
Senftenberg	6	6.74	0.69
Anatum	4	4.49	0.46
Newport	3	3.37	0.34
Montevideo	2	2.25	0.23
Reading	2	2.25	0.23
Typhimurium	2	2.25	0.23
[a]Other serotypes	8	8.99	0.92
[b]Unidentified	0		
Total serotyped isolates	89		10.19
Not typed	0		
*Total positive	89		10.19
Total number of analyzed samples	873		

Table 7 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2011	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
[c]III 18:z4,z23:-	13	23.21	2.4
Hadar	9	16.1	1.7
Muenchen	9	16.1	1.7
Schwarzengrund	7	12.5	1.3
Heidelberg	3	5.4	0.6
Newport	3	5.4	0.6
Reading	3	5.4	0.6
Saintpaul	3	5.4	0.6
Berta	2	3.6	0.4
Kentucky	2	3.6	0.4
Worthington	2	3.6	0.4
[a]Other serotypes	10	15.15	1.86
[b]Unidentified	0	0	0
Total serotyped isolates	66	100	12.24
Not typed	0	0	0
*Total positive	66	100	12.24
Total number of analyzed samples	539		

Table 7 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2012	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
III_18:z4,z23:-	13	23.21	1.1
Hadar	9	16.1	0.8
Muenchen	9	16.1	0.8
Schwarzengrund	7	12.5	0.6
Heidelberg	3	5.4	0.3
Newport	3	5.4	0.3
Reading	3	5.4	0.3
Saintpaul	3	5.4	0.3
Berta	2	3.6	0.2
Kentucky	2	3.6	0.2
Worthington	2	3.6	0.2
[a]Other serotypes	10	15.15	0.87
[b]Unidentified	0	0	0.00
Total serotyped isolates	66	100.0	5.71
Not typed	0	0	0.00
*Total positive	66	100	5.71
Total number of analyzed samples	1,155		

Table 7 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Ground Turkey
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2013	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Muenchen	3	9.09	1.4
[c]I 4,[5],12:I:-	3	9.1	1.4
Newport	3	9.1	1.4
Reading	3	9.1	1.4
Berta	3	9.1	1.4
Albany	2	6.1	0.9
Senftenberg	2	6.1	0.9
Agona	2	6.1	0.9
Hadar	2	6.1	0.9
Iii_18:Z4,Z23:-	2	6.1	0.9
Typhimurium	1	3.0	0.5
Schwarzengrund	1	3.0	0.5
Saintpaul	1	3.0	0.5
Ohio	1	3.0	0.5
Derby	1	3.0	0.5
Ouakam	1	3.0	0.5
Heidelberg	1	3.0	0.5
Dublin	1	3.0	0.5
[a]Other serotypes	0	0	0
[b]Unidentified	0	0	0
Total serotyped isolates	33	100	15.21
Not typed	0	0	0.00
*Total positive	33	100	15.21
Total number of analyzed samples	217		

*The percentages listed for total positive isolates may not equal the sum of the data in the Percent of Analyzed Samples column due to rounding.
[a]The ten most commonly isolated serotypes during a listed year are identified by name while less commonly identified serotypes are included in the "other serotypes" category. When there is more than one serotype in tenth place, all serotypes in tenth place are listed.
[b]The "unidentified" designation includes isolates for which a single specific serotype could not be determined including rough, and/or nonmotile.
[c]Prior to 2004, FSIS classified serotypes identified solely by antigenic formulas as monophasic, such as I 4, [5],12:i:-, and included them in the unidentified isolates category.

Of note: The figures display the percent of the isolates identified out of total isolates serotyped for each product class. The y axis, the serotype percentage, varies from graph to graph because the percent of different serotypes varies by commodity and year.

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Table 8
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Turkeys (Turkey Carcasses)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2006	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	65	32.83	2.33
Heidelberg	33	16.67	1.18
Reading	13	6.57	0.47
Schwarzengrund	13	6.57	0.47
Saintpaul	10	5.05	0.36
Agona	8	4.04	0.29
Senftenberg	8	4.04	0.29
Anatum	5	2.53	0.18
Derby	4	2.02	0.14
Muenster	4	2.02	0.14
[a]Other serotypes	31	15.66	1.11
[b]Unidentified	4	2.02	0.14
Total serotyped isolates	198		7.11
Not typed	0		
Total positive	198		7.11
Total number of analyzed samples	2,785		

Table 8-Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Turkeys (Turkey Carcasses)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2007	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	54	50.00	3.10
Senftenberg	9	8.33	0.52
Saintpaul	8	7.41	0.46
Heidelberg	6	5.56	0.34
Newport	5	4.63	0.29
Agona	3	2.78	0.17
Berta	3	2.78	0.17
Montevideo	3	2.78	0.17
Mbandaka	2	1.85	0.11
Muenchen	2	1.85	0.11
Reading	2	1.85	0.11
Schwarzengrund	2	1.85	0.11
Typhimurium	2	1.85	0.11
[a]Other serotypes	6	5.56	0.34
[b]Unidentified	1	0.93	0.06
Total serotyped isolates	108		6.19
Not typed	0		
Total positive	108		6.19
Total number of analyzed samples	1,744		

Table 8 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Turkeys (Turkey Carcasses)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2008	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	3	37.50	2.33
Agona	1	12.50	0.78
Berta	1	12.50	0.78
Newport	1	12.50	0.78
Schwarzengrund	1	12.50	0.78
[a]Other serotypes	0		
[b]Unidentified	1	12.50	0.78
Total serotyped isolates	8		6.20
Not typed	0		
*Total positive	8		6.20
Total number of analyzed samples	129		

Table 8 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Turkeys (Turkey Carcasses)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2009	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	18	33.33	1.25
Agona	9	16.67	0.63
Albany	3	5.56	0.21
Muenchen	3	5.56	0.21
Senftenberg	3	5.56	0.21
Derby	2	3.70	0.14
Heidelberg	2	3.70	0.14
Kentucky	2	3.70	0.14
Typhimurium	2	3.70	0.14
[c]4, [5],12:l:-	1	1.85	0.07
[c]8,20:-:z6	1	1.85	0.07
Anatum	1	1.85	0.07
Infantis	1	1.85	0.07
Johannesburg	1	1.85	0.07
Mbandaka	1	1.85	0.07
Montevideo	1	1.85	0.07
Newport	1	1.85	0.07
Saintpaul	1	1.85	0.07
Schwarzengrund	1	1.85	0.07
[a]Other serotypes	0		
[b]Unidentified	0		
Total serotyped isolates	54		3.77
Not typed	0		
Total positive	54		3.77
Total number of analyzed samples	1,432		

Table 8 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Turkeys (Turkey Carcasses)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2010	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	15	22.73	1.04
Muenchen	9	13.64	0.62
Saintpaul	6	9.09	0.42
Heidelberg	5	7.58	0.35
Schwarzengrund	5	7.58	0.35
Agona	4	6.06	0.28
Brandenburg	3	4.55	0.21
Anatum	2	3.03	0.14
Berta	2	3.03	0.14
Newport	2	3.03	0.14
Typhimurium var. 5-	2	3.03	0.14
[a]Other serotypes	9	13.64	0.62
[b]Unidentified	1	1.52	0.07
Total serotyped isolates	65		4.50
Not typed	1		0.07
*Total positive	66		4.57
Total number of analyzed samples	1,444		

Table 8 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Turkeys (Turkey Carcasses)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2011	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	10	27.03	0.62
Albany	3	8.11	0.19
Berta	3	8.11	0.19
Saintpaul	3	8.11	0.19
Schwarzengrund	3	8.11	0.19
Agona	2	5.41	0.12
Heidelberg	2	5.41	0.12
Montevideo	2	5.41	0.12
[c]4, [5],12:I:-	1	2.70	0.06
Brandenburg	1	2.70	0.06
Cubana	1	2.70	0.06
Dublin	1	2.70	0.06
Newport	1	2.70	0.06
Orion var.15+	1	2.70	0.06
Reading	1	2.70	0.06
Typhimurium	1	2.70	0.06
Uganda	1	2.70	0.06
[a]Other serotypes	0	0	0
[b]Unidentified	0	0	0
Total serotyped isolates	37	100	2.31
Not typed	0	0	0
*Total positive	37	100	2.31
Total number of analyzed samples	1,605		

Table 8 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Turkeys
(1998–2005 'A' Set Samples; 2006–2012 All Samples)

Serotypes 2012	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Heidelberg	9	27.03	0.41
Senftenberg	6	8.11	0.27
Reading	4	8.11	0.18
Albany	4	8.11	0.18
Hadar	4	8.11	0.18
Agona	4	5.41	0.18
Saintpaul	3	5.41	0.14
Schwarzengrund	3	5.41	0.14
Muenchen	3	2.70	0.14
Montevideo	2	2.70	0.09
Havana	1	2.70	0.05
Typhimurium	1	2.70	0.05
Enteritidis	1	2.70	0.05
Anatum	1	2.70	0.05
Ouakam	1	2.70	0.05
Litchfield	1	2.70	0.05
Heidelberg	9	2.70	0.41
[a]Other serotypes	0	0	0
[b]Unidentified	0	0	0
Total serotyped isolates	48	100	2.20
Not typed	0	0	0
*Total positive	48	100	2.20
Total number of analyzed samples	2,183		

Table 8 - Continued
Profile of Serotypes from Analyzed PR/HACCP Verification Samples by Calendar Year.
Young Turkeys (Turkey Carcasses)
(1998–2005 'A' Set Samples; 2006–2013 All Samples)

Serotypes 2013	Number of Isolates	Percent of Total Positive	Percent of Analyzed Samples
Hadar	10	18.18	0.41
Reading	7	12.73	0.29
Muenchen	5	9.09	0.21
Heidelberg	5	9.09	0.21
Typhimurium	4	7.27	0.17
Worthington	3	5.45	0.12
Berta	3	5.45	0.12
[c]4,[5],12:i:-	3	5.45	0.12
Albany	3	5.45	0.12
Senftenberg	2	3.64	0.08
Enteritidis	2	3.64	0.08
Anatum	2	3.64	0.08
Saintpaul	2	3.64	0.08
Schwarzengrund	1	1.82	0.04
Derby	1	1.82	0.04
Agona	1	1.82	0.04
Newport	1	1.82	0.04
[a]Other serotypes	0	0	0
[b]Unidentified	0	0	0
Total serotyped isolates	55	100	2.28
Not typed	0	0	0
*Total positive	55	100	2.28
Total number of analyzed samples	453		

**Note: Sampling for young turkey began in 2006.

*The percentages listed for total positive isolates may not equal the sum of the data in the Percent of Analyzed Samples column due to rounding.

[a]The ten most commonly isolated serotypes during a listed year are identified by name while less commonly identified serotypes are included in the “other serotypes” category. When there is more than one serotype in tenth place, all serotypes in tenth place are listed.

[b]The “unidentified” designation includes isolates for which a single specific serotype could not be determined including rough, and/or nonmotile.

[c]Prior to 2004, FSIS classified serotypes identified solely by antigenic formulas as monophasic, such as I 4, [5],12:i:-, and included them in the unidentified isolates category.

Of note: The figures display the percent of the isolates identified out of total isolates serotyped for each product class. The y axis, the serotype percentage, varies from graph to graph because the percent of different serotypes varies by commodity and year.

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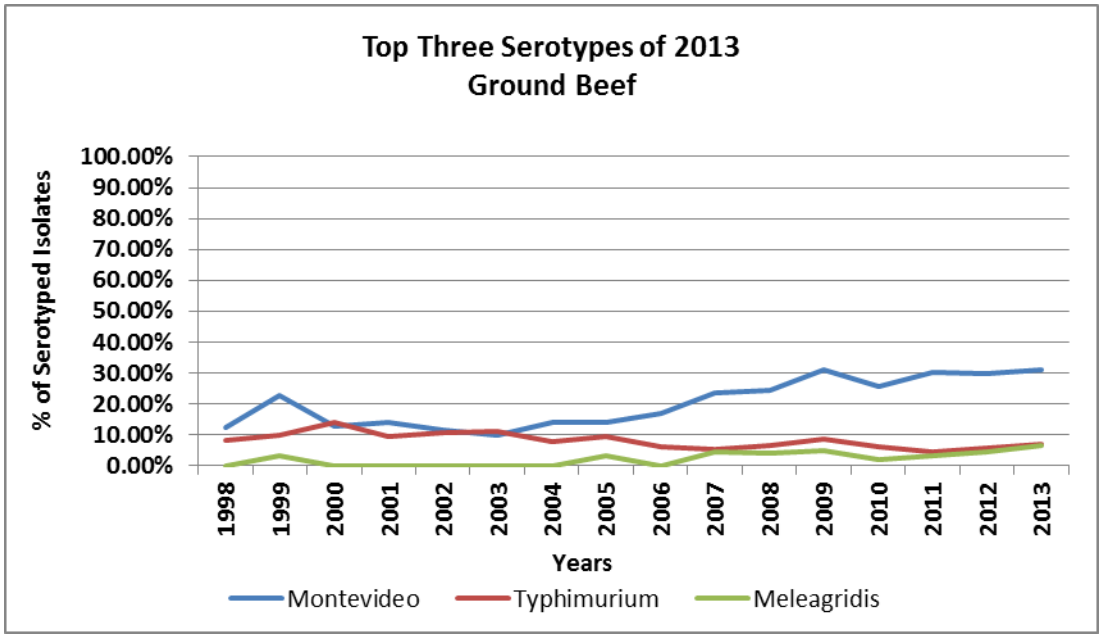
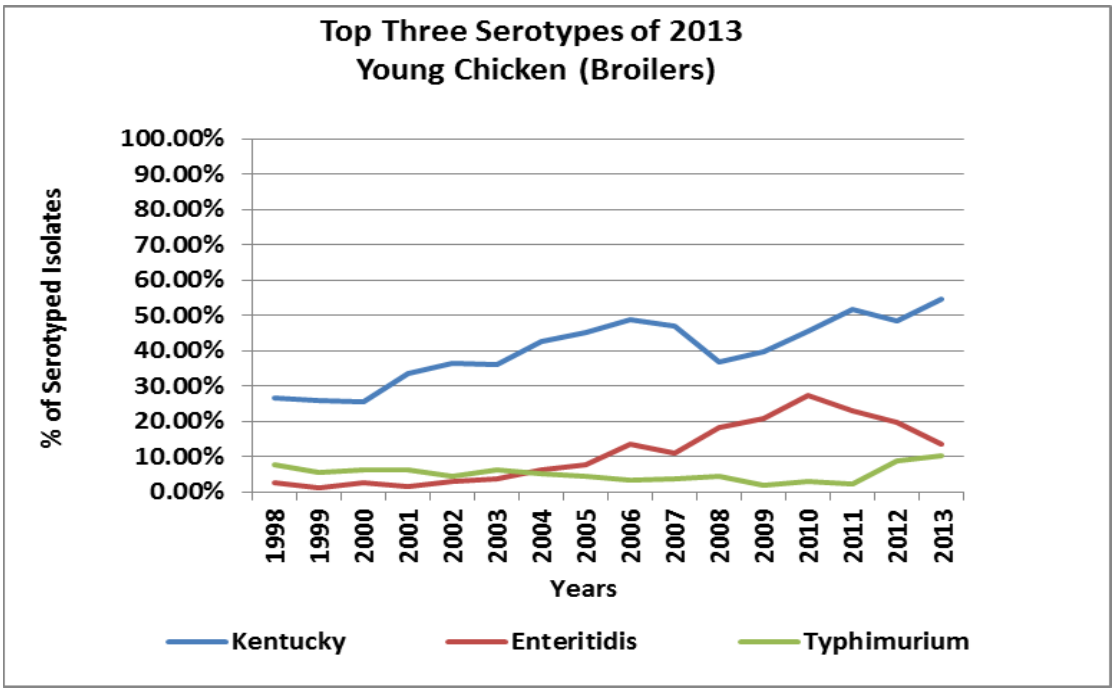
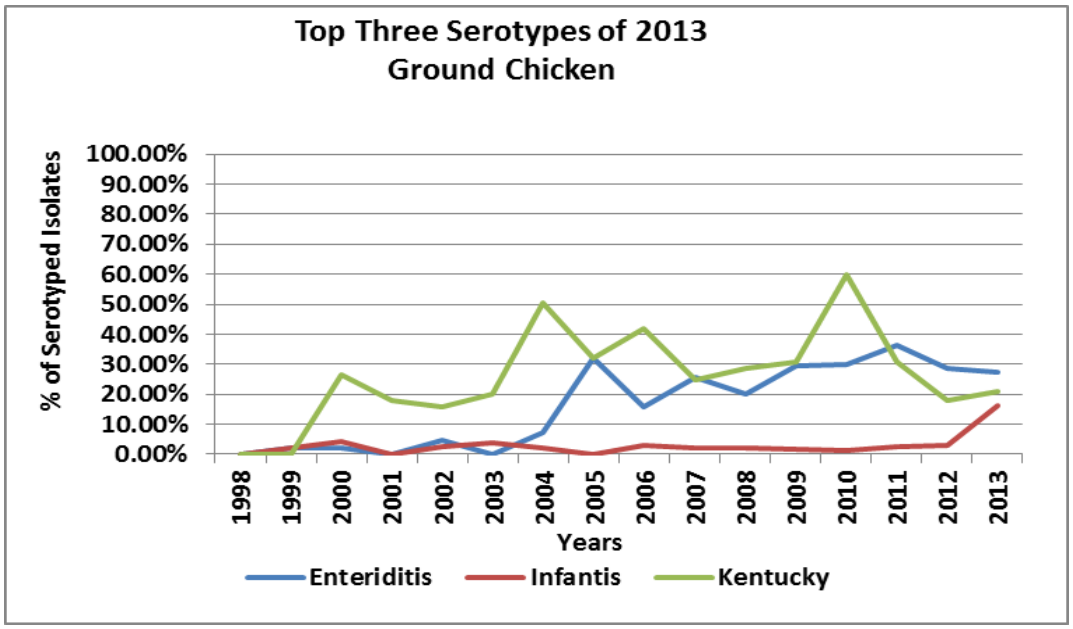
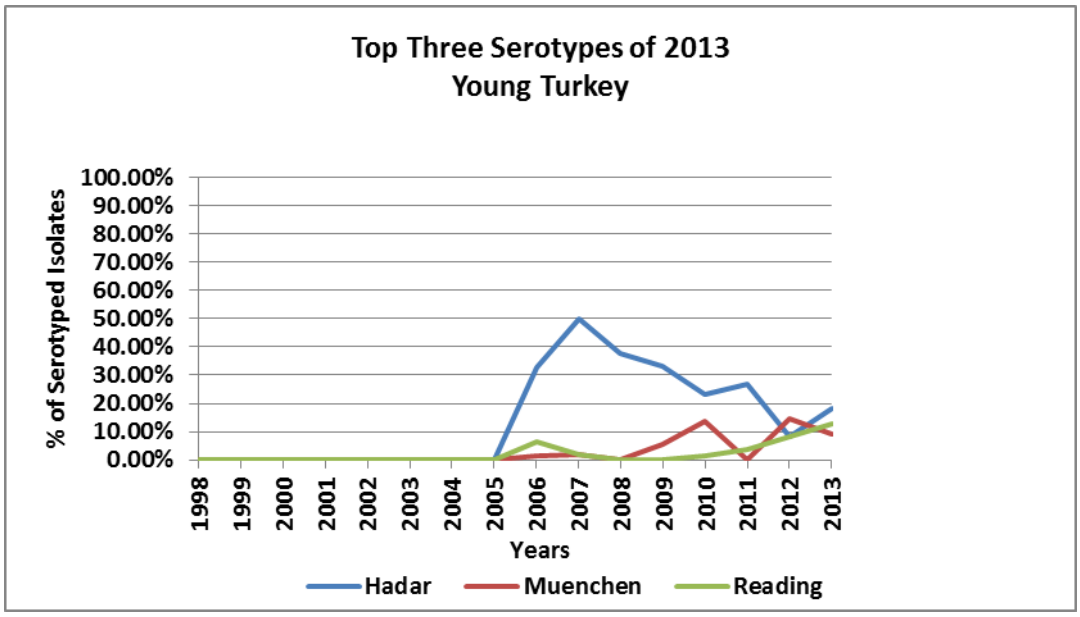
Figure 1
Top Three *Salmonella* Serotypes for Each Product Class
PR/HACCP Verification Sampling




Top Three Serotypes of 2013
Young Chicken (Broilers)
% of Serotyped Isolates
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Years
Kentucky
Enteritidis
Typhimurium


Top Three Serotypes of 2013
Ground Chicken
% of Serotyped Isolates
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013
Years
Enteriditis
Infantis
Kentucky


Top Three Serotypes of 2013
Young Turkey
% of Serotyped Isolates
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Years
Hadar
Muenchen
Reading

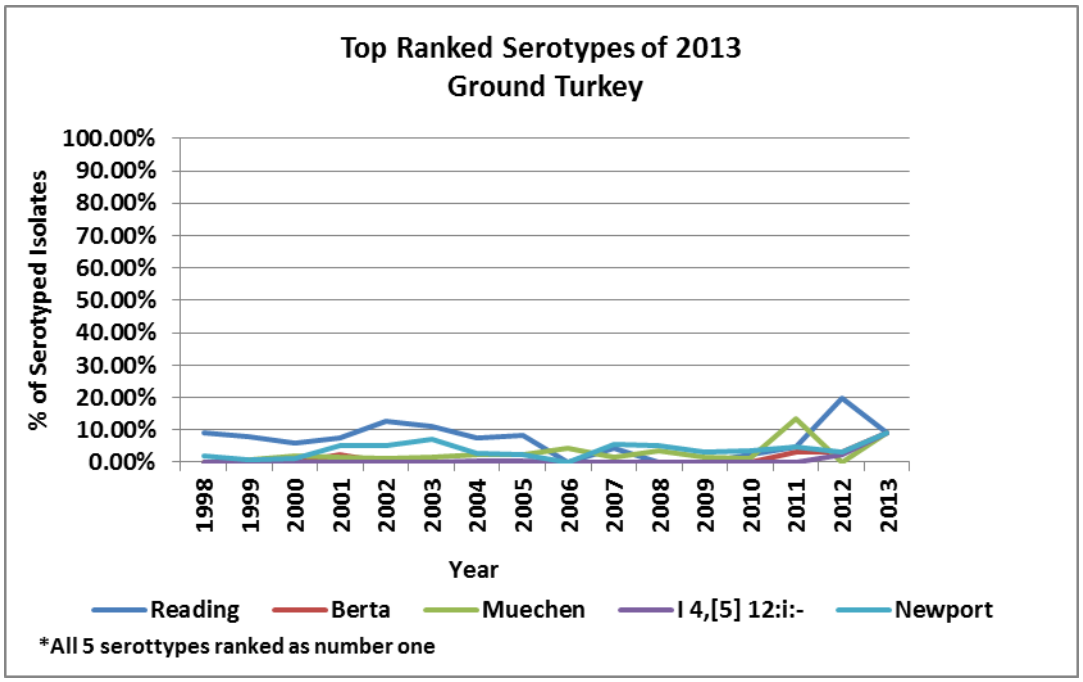
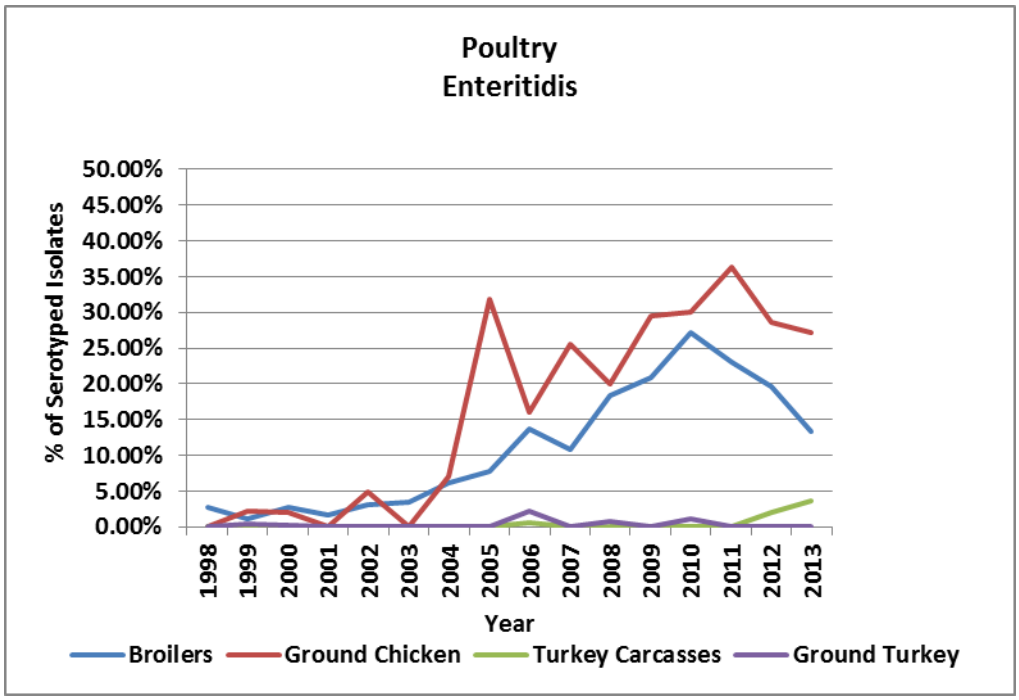
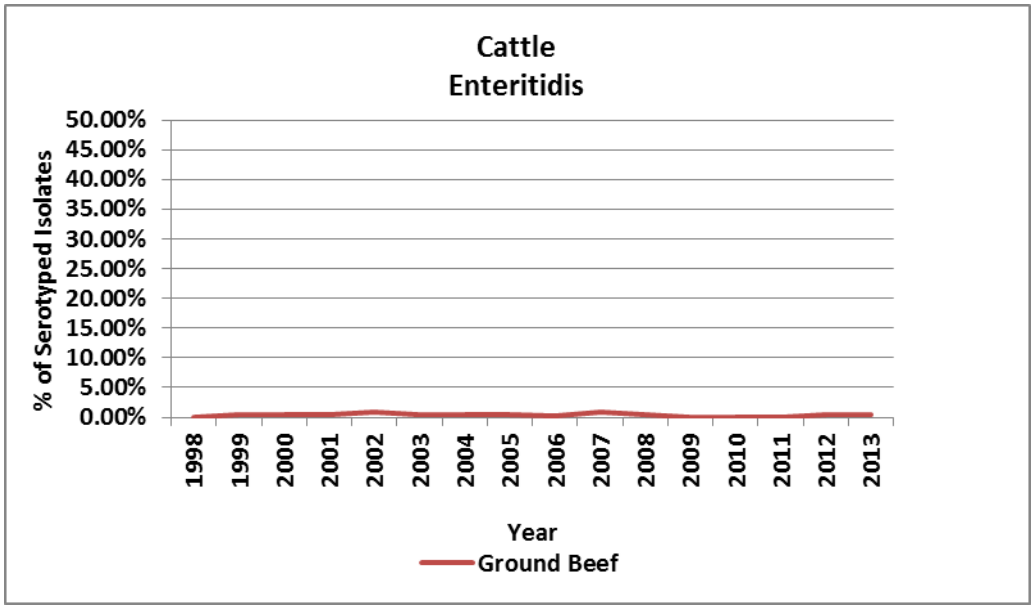
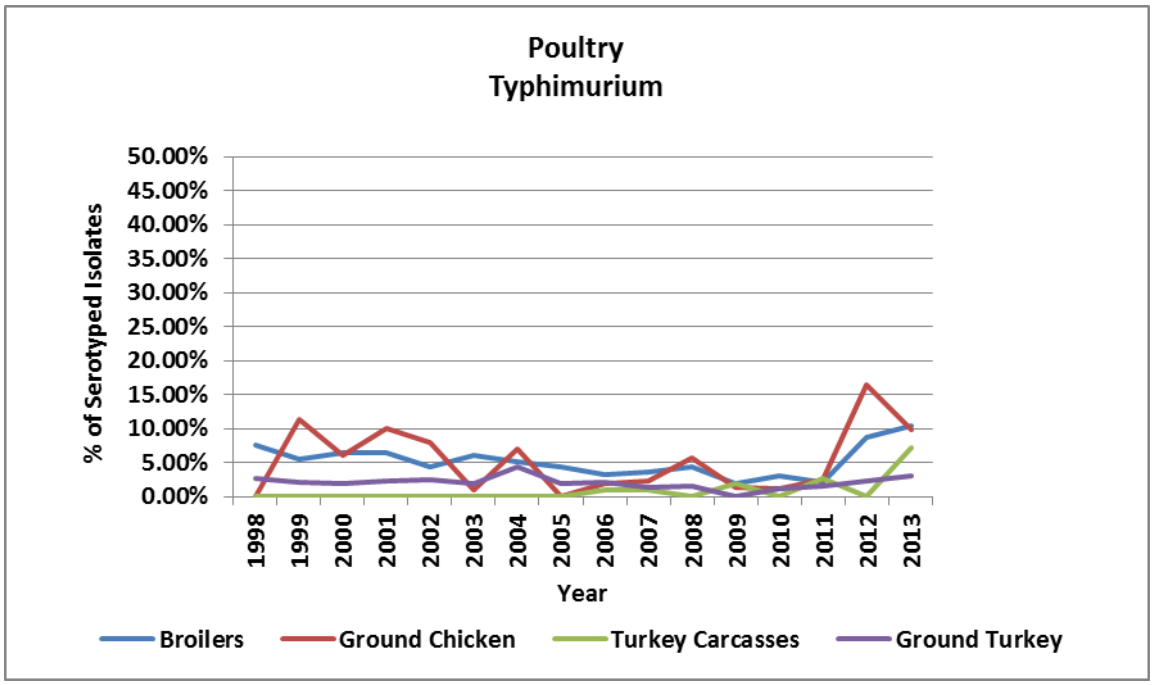

Top Ranked Serotypes of 2013
Ground Turkey
% of Serotyped Isolates
100.00%
90.00%
80.00%
70.00%
60.00%
50.00%
40.00%
30.00%
20.00%
10.00%
0.00%
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year
Reading
Berta
Muechen
I 4,[5] 12:i:-
Newport
*All 5 serottypes ranked as number one

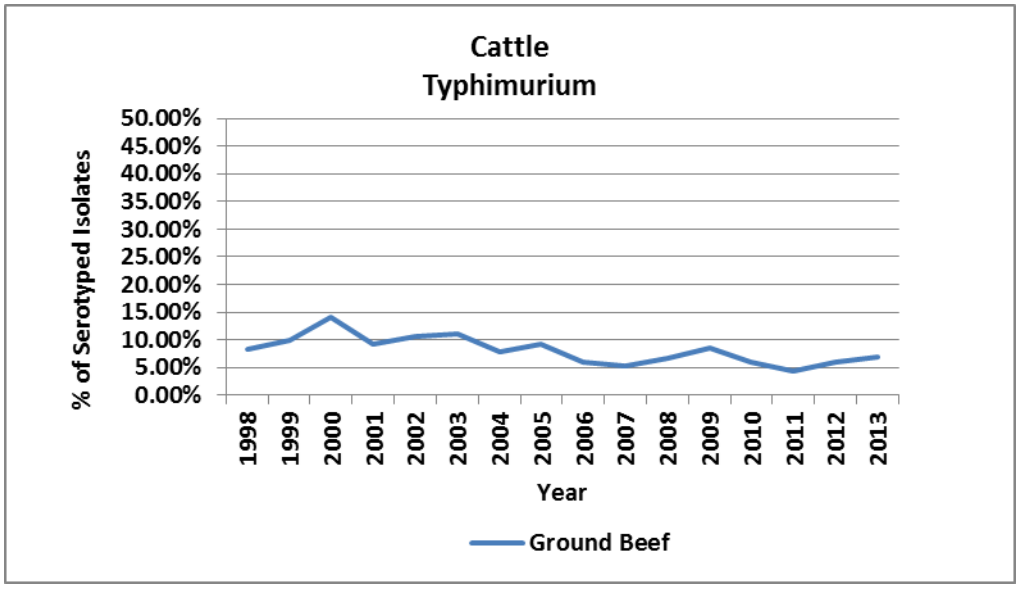
Figure 2
Serotype Profiles in FSIS Product Classes for Top 10 Serotypes Identified by CDC as Causing Human Infections in 2013 – USDA, FSIS, PR/HACCP Verification Sampling by Calendar Year*(1998–2005 - "A" Set Samples; 2006–2013 - All Samples)

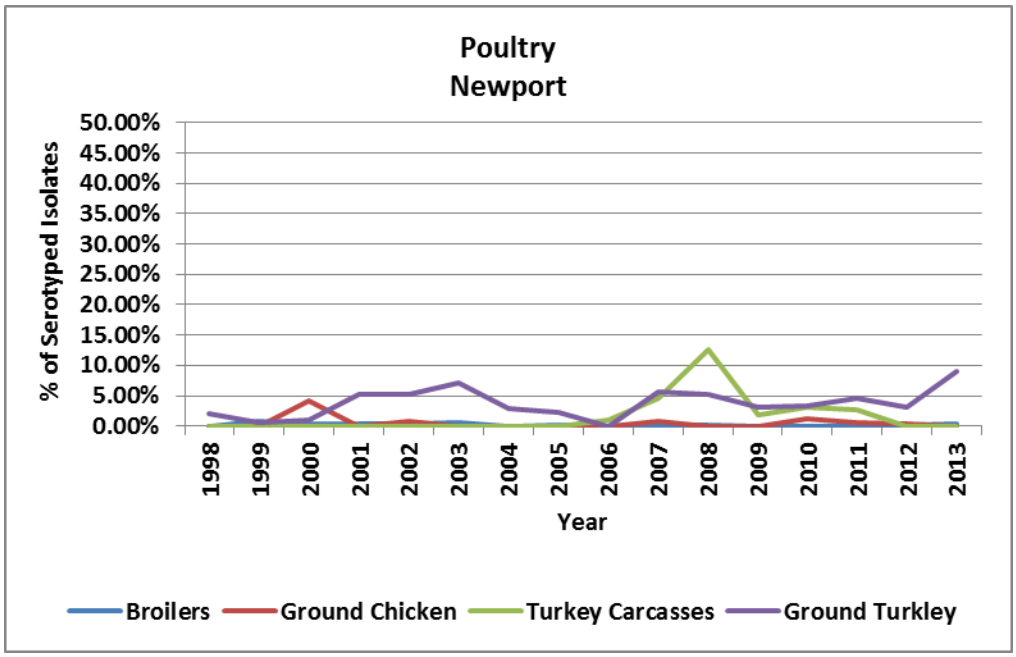






turkey started in 2005




Poultry
Newport
% of Serotyped Isolates
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
1998
1999
2000
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2006
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2008
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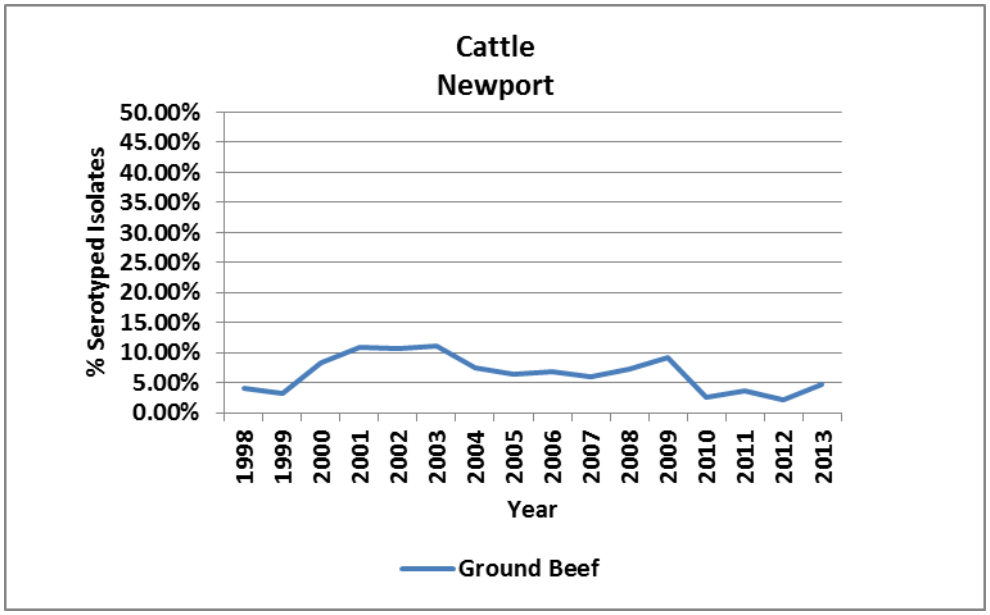
2010
2011
2012
2013
Year
Broilers
Ground Chicken
Turkey Carcasses
Ground Turkley


Cattle
Newport
% Serotyped Isolates
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
1998
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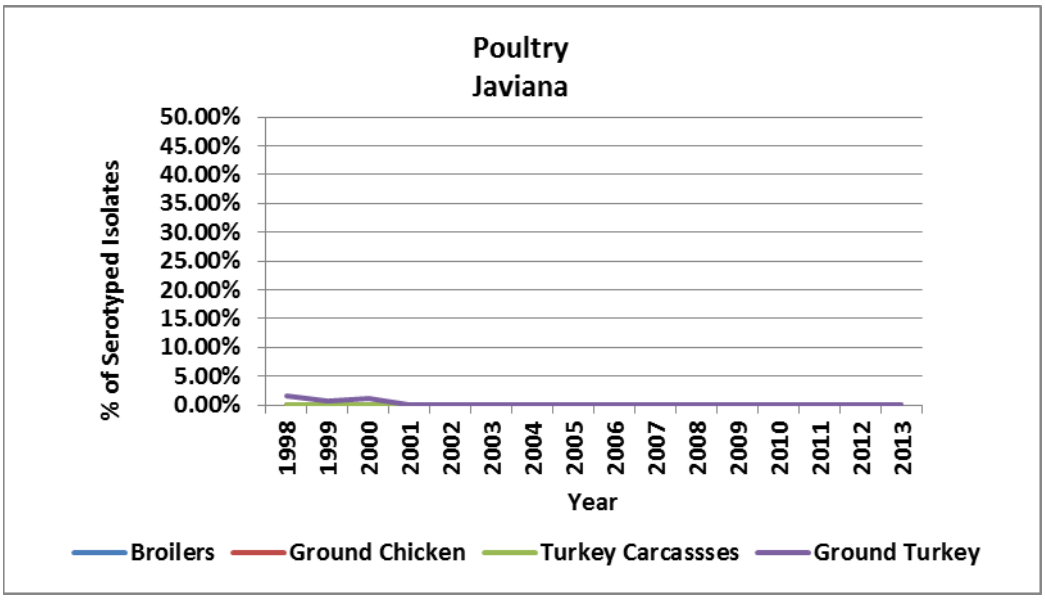
2010
2011
2012
2013
Year
Ground Beef


Poultry
Javiana
% of Serotyped Isolates
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
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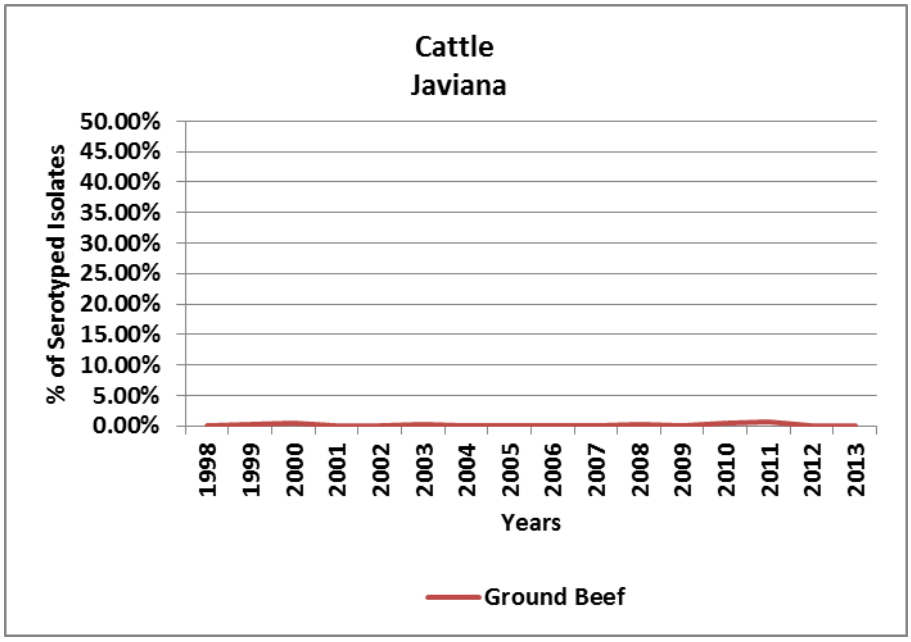
2011
2012
2013
Year
Broilers
Ground Chicken
Turkey Carcassses
Ground Turkey


Cattle
Javiana
% of Serotyped Isolates
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
1998
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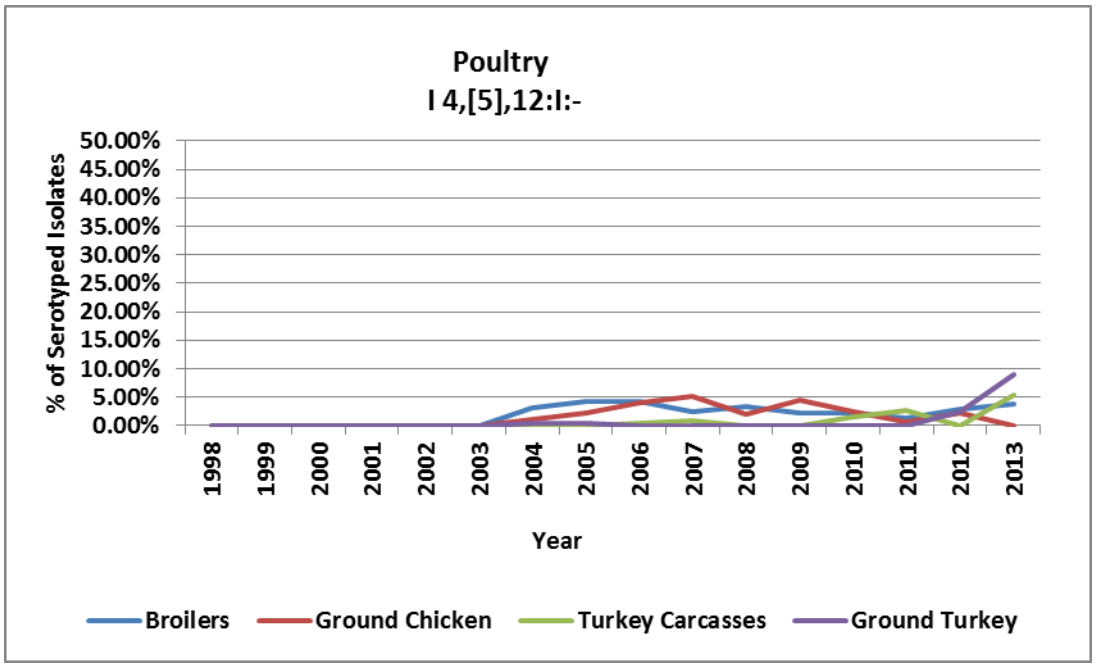
2010
2011
2012
2013
Years
Ground Beef


Poultry
I 4,[5],12:I:-
% of Serotyped Isolates
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
1998
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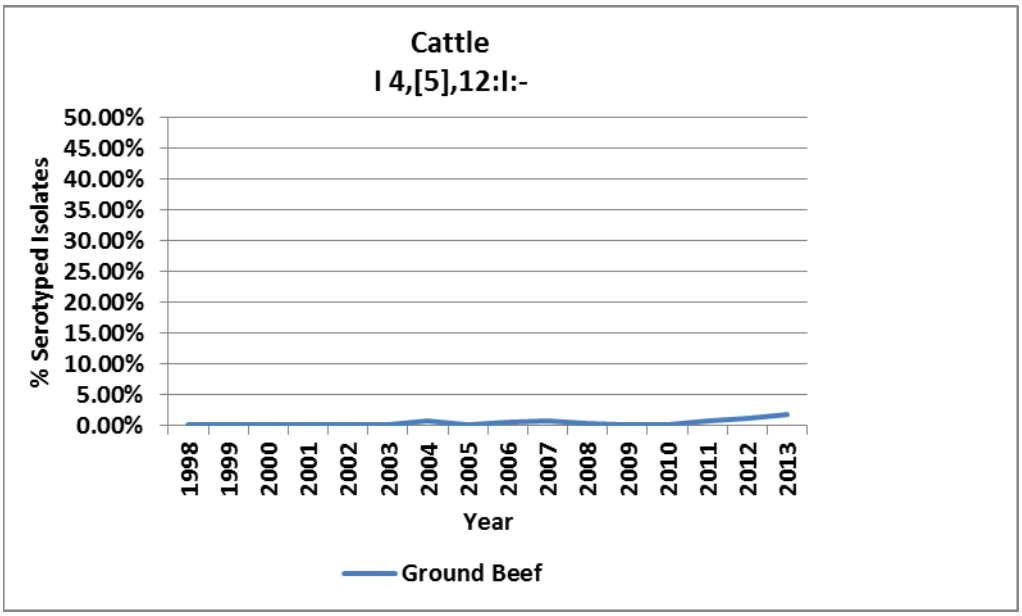
2010
2011
2012
2013
Year
Broilers
Ground Chicken
Turkey Carcasses
Ground Turkey


Cattle
I 4,[5],12:I:-
% Serotyped Isolates
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
1998
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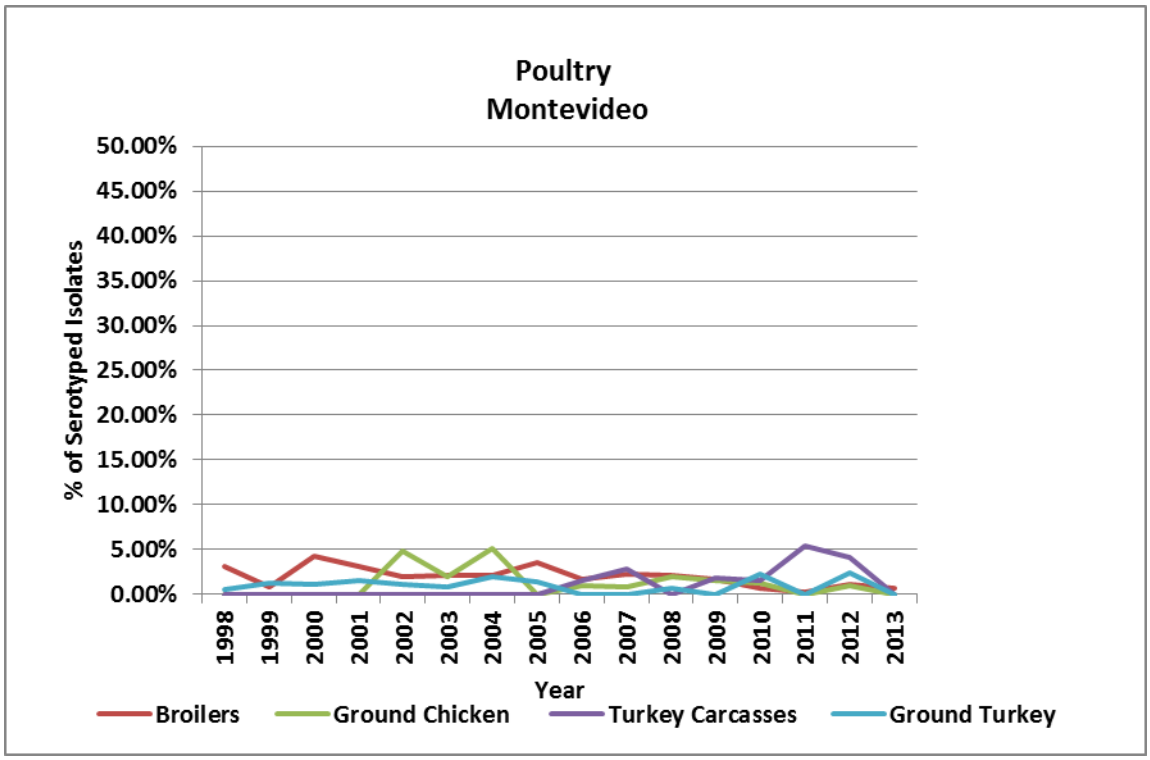
2008
2009
2010
2011
2012
2013
Year
Ground Beef


Poultry
Montevideo
% of Serotyped Isolates
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
1998
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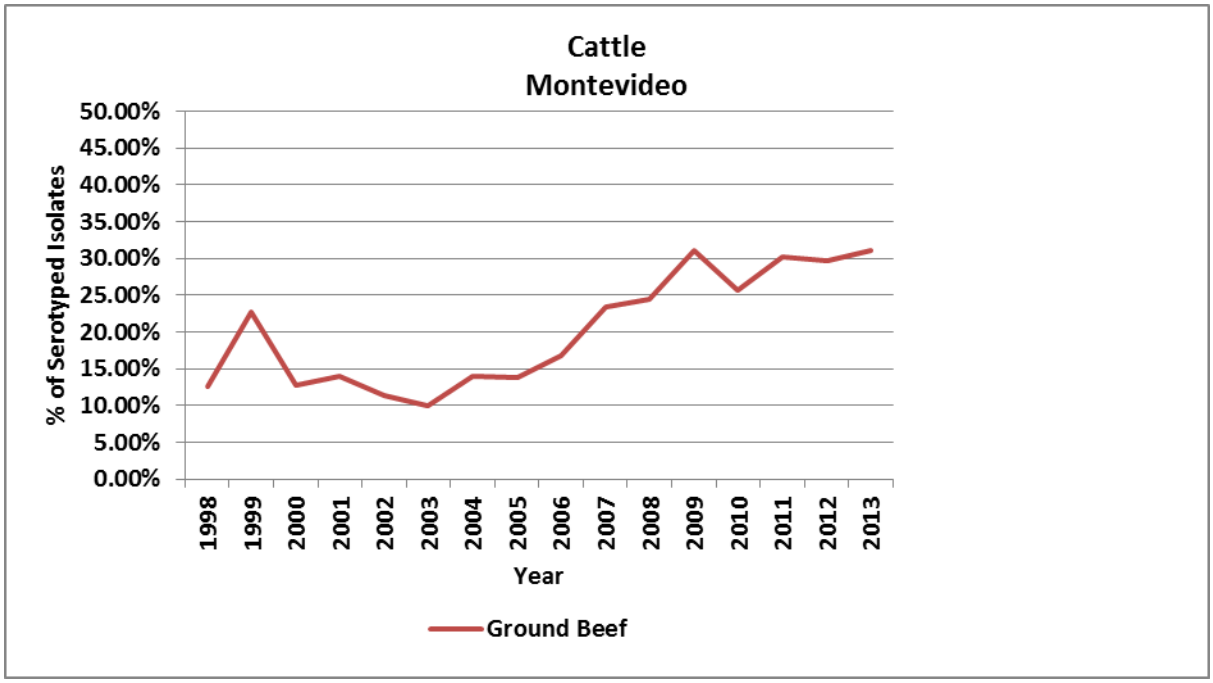
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year
Broilers
Ground Chicken
Turkey Carcasses
Ground Turkey


Cattle
Montevideo
% of Serotyped Isolates
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
1998
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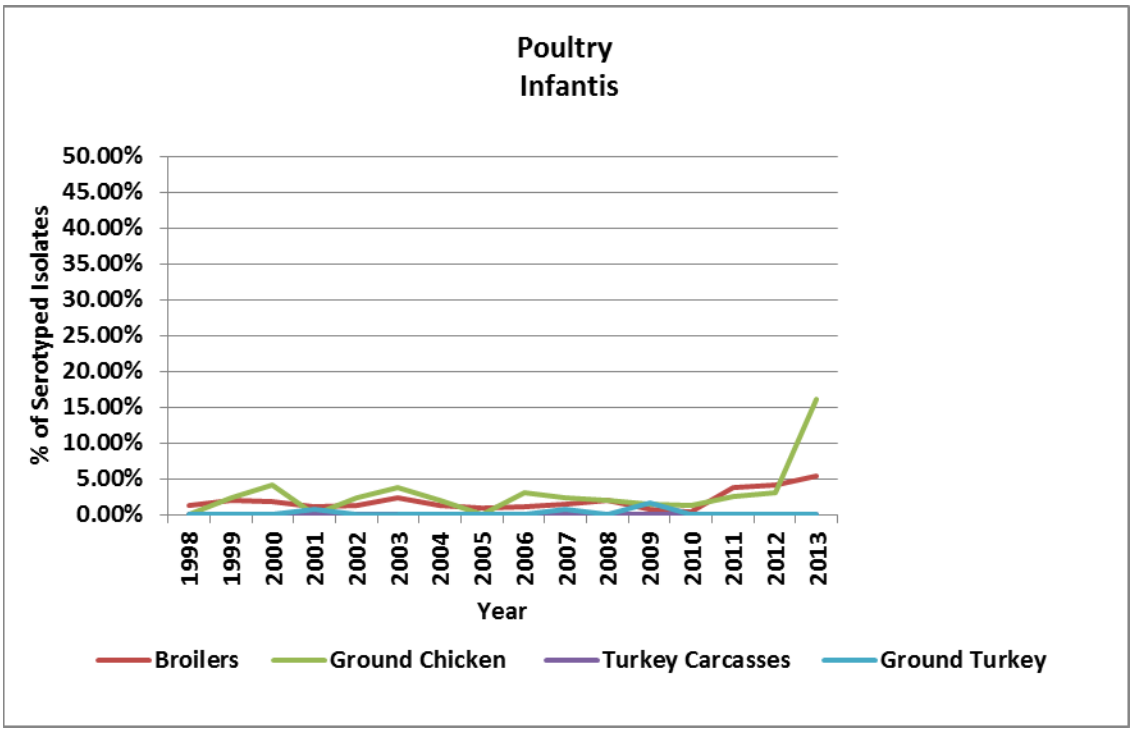
2006
2007
2008
2009
2010
2011
2012
2013
Year
Ground Beef


Poultry
Infantis
% of Serotyped Isolates
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
1998
1999
2000
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2006
2007
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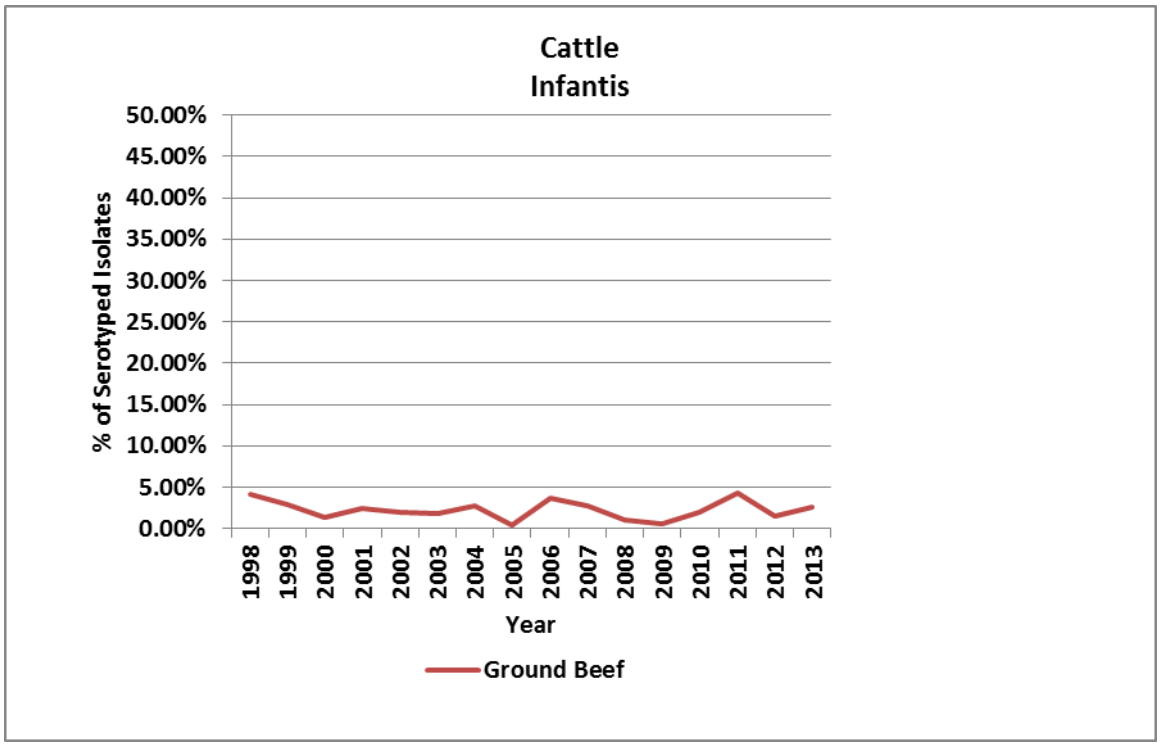
2010
2011
2012
2013
Year
Broilers
Ground Chicken
Turkey Carcasses
Ground Turkey


Cattle
Infantis
% of Serotyped Isolates
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
1998
1999
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2001
2002
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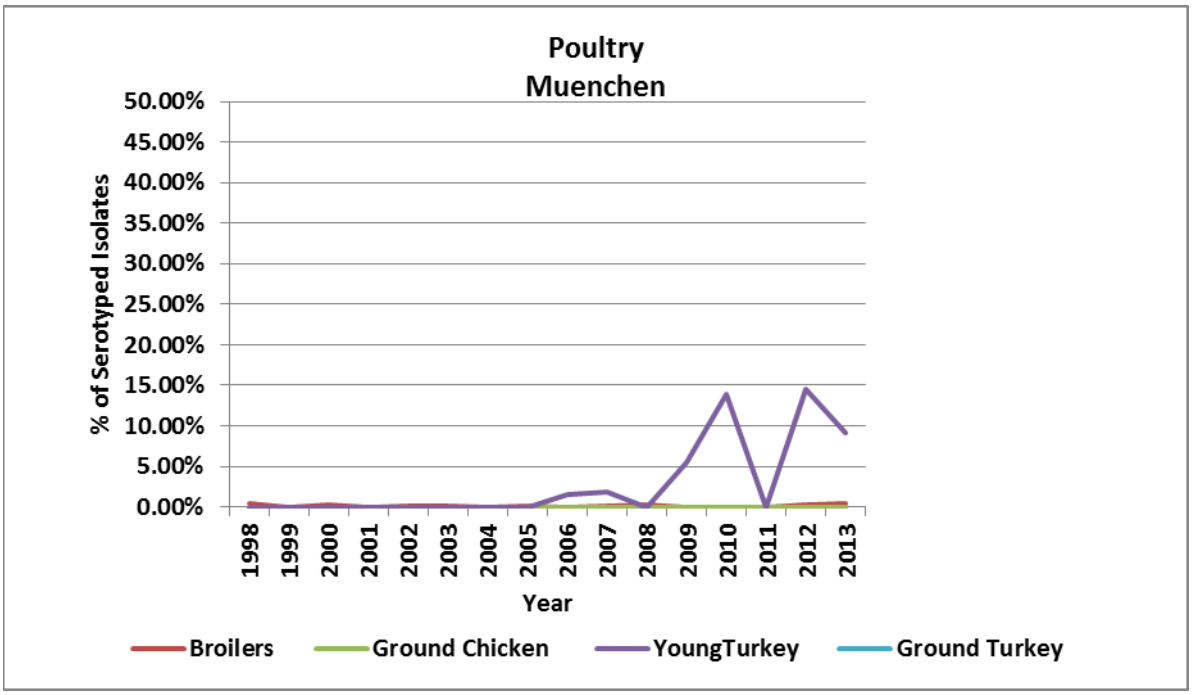
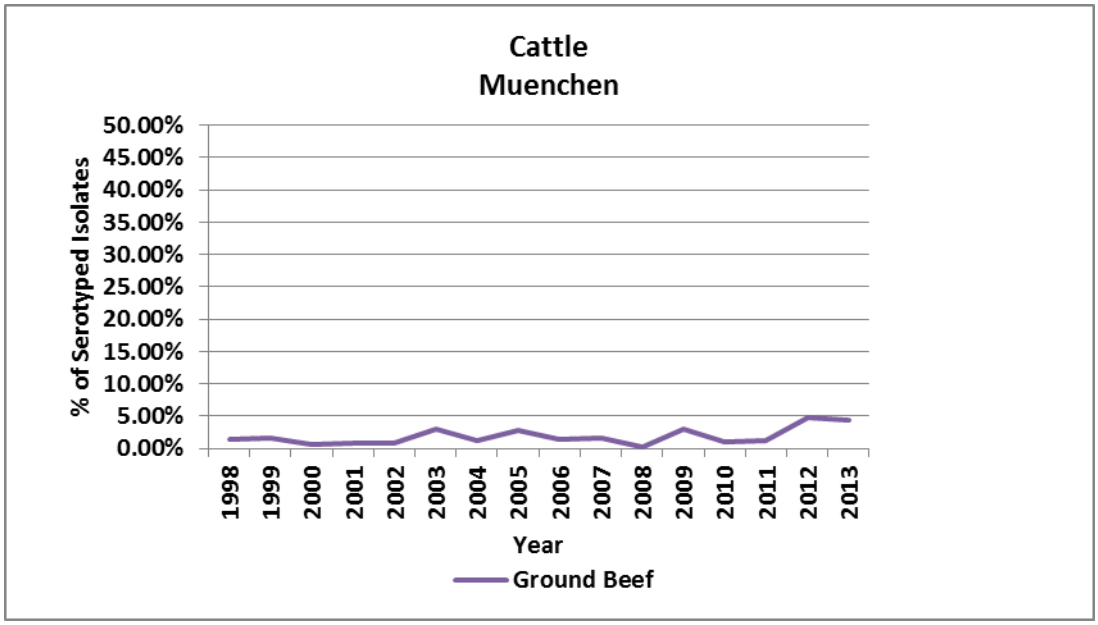
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year
Ground Beef


Poultry
Muenchen
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
% of Serotyped Isolates
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Year
Broilers
Ground Chicken
YoungTurkey
Ground Turkey


Cattle
Muenchen
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
% of Serotyped Isolates
1998
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2004
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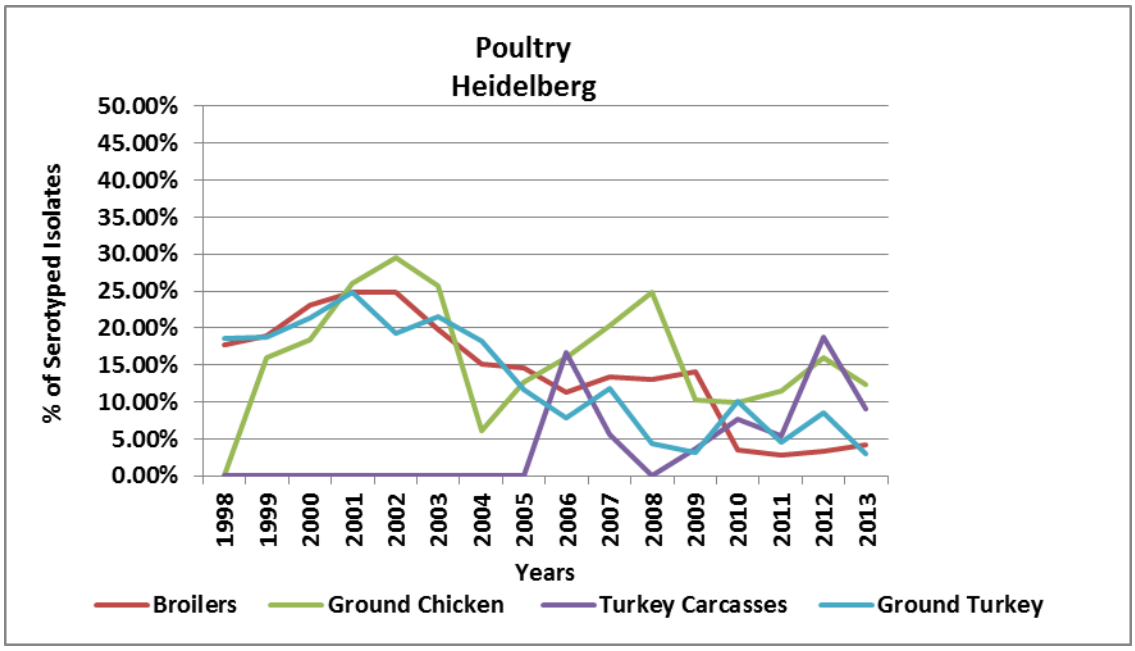
2006
2007
2008
2009
2010
2011
2012
2013
Year
Ground Beef


Poultry
Heidelberg
% of Serotyped Isolates
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
1998
1999
2000
2001
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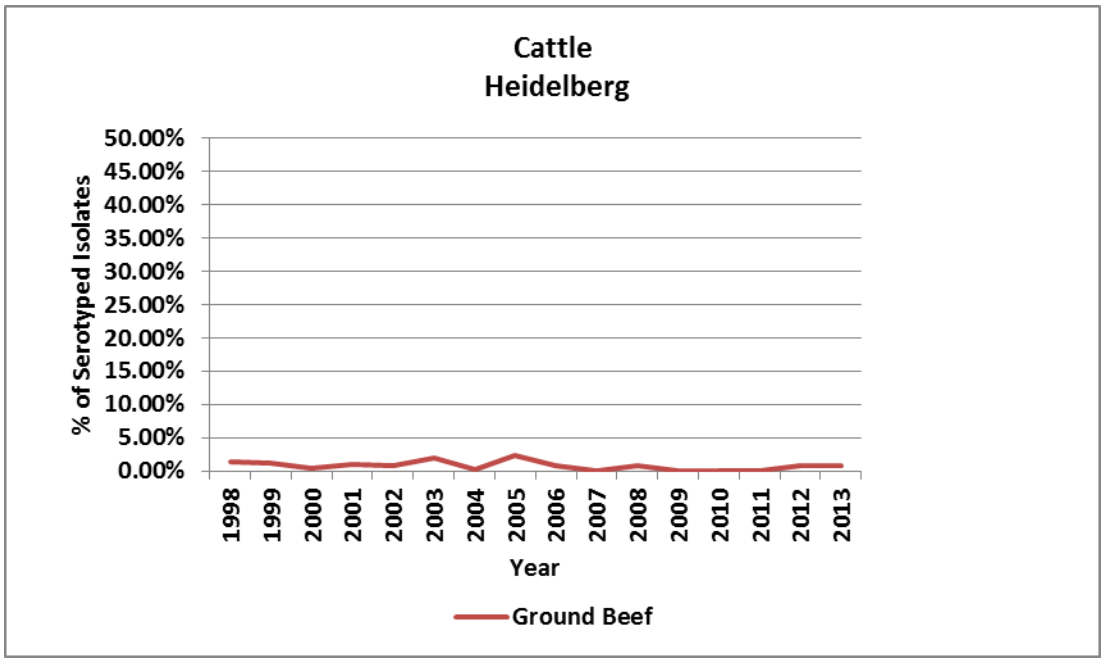
2006
2007
2008
2009
2010
2011
2012
2013
Years
Broilers
Ground Chicken
Turkey Carcasses
Ground Turkey


Cattle
Heidelberg
% of Serotyped Isolates
50.00%
45.00%
40.00%
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
1998
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2013
Year
Ground Beef